ELECTRICAL WEST

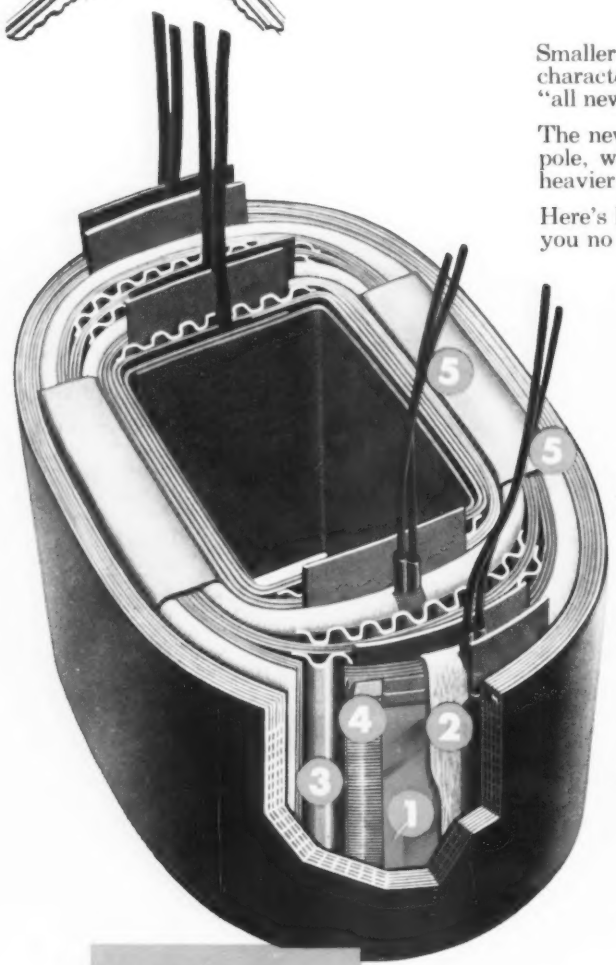
A McGRAW-HILL PUBLICATION

June 1960
50 Cents

CONVENTIONS—1960

the KUHLMAN 60

NEW KUHLMAN COIL INCREASES MARGIN OF SAFETY—CUTS TRANSFORMER WEIGHT AND SIZE



Smaller—lighter—improved impulse voltage distribution characteristics—these are the outstanding features of the "all new" Kuhlman '60 transformer.

The new design puts more transformer per pound on the pole, with the same low losses and high performance of heavier units.

Here's how Kuhlman's new coil design eliminates weight you no longer need:

1. *Equalized voltage stress.* A newly developed equalizing shield protects the winding from sudden surges. Voltage stresses are equally distributed so that no portion of the winding is subjected to the full strength of a surge. Result: A more compact coil with improved impulse voltage distribution characteristics, higher margin of safety.

2. *Improved space factor.* In addition to shielding, special insulation is used to provide puncture as well as creep values. The use of puncture insulation permits a more compact coil with better impulse voltage distribution characteristics.

3. *Planned cooling.* Coil compactness is balanced with ample cooling. Generous ducts are placed in the windings to provide rapid heat transfer and low temperature gradient, thus giving rise to longer transformer life.

4. *Greater mechanical strength.* Insulation crimping at the end of each layer of windings has been lengthened to increase mechanical support. This added support makes a mechanically stronger coil.

5. *All crossing of primary leads is eliminated.* Start and finish leads come out at opposite ends of the windings.

This use of better and more costly materials results in a smaller core and coil, a smaller tank and a general all-over reduction in weight and size.

So why put weight on the pole you don't need? Install the "all new" lighter, more compact Kuhlman '60.

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Mich.

Manufacturers of transformers since 1894

Western Division: **SALINAS, CALIFORNIA**

editorial views EW

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Sequel—Many readers have been most kind in their comments about the editorial entitled "The Philadelphia Story" which appeared on this page in the March issue. If there is a consensus in these comments, it is that the price in dollars is only one small measure of the real value of a piece of electrical equipment. The government, which is seeking penalties for alleged price fixing, recognizes this fact as attested by its meticulous evaluation of bids. The difference between "price" and "value" is underscored by many other factors as well. The customer takes into consideration the reputation of the company that builds the equipment; the buyer notices and subconsciously evaluates the nearness of service facilities and the availability of trained service personnel; the user certainly judges the record of reliability in making his ultimate selection; the public, as represented by its regulatory authorities, is more interested in the lowest over-all cost during a piece of equipment's life than it is in the dollar figure on the bid.

Hence, even though the dollar price may be the same, each product offers the buyer a wide variety of selections. Some products are superior in certain ways and inferior in others. Just as long as this is true, so-called "price fixing in restraint of trade" becomes the academic abstraction so dearly loved by the legal minds as a source of profuse verbiage, lusty fees and political ambitions.

Meanwhile the results of the Philadelphia inquisition are being felt throughout the industry in form of blighted careers, softening morale, weakening prices, growing concern as to where the self-imposed restraint on lateral communications within the industry may lead.

Flight From the Campus?—Two rather disquieting bits of information again focus attention on the struggle to build up the country's engineering education plant. The American Society for Engineering Education reports that engineering enrollments are down for the second consecutive year. Engineering freshmen enrolled in the fall of 1959 totaled 240,063 compared to 249,950 in 1958 and 257,777 in 1957. Thus there will be a marked decrease in the number of engineering graduates in 1962 and 1963 just when the booming '60s are likely to demand the highest number ever.

The National Society of Professional Engineers has reported a survey conducted by A. R. Helwarth, assistant dean of the University of Michigan, College of Engineering, which checks reasons why engineering teachers leave the academic calm of the campus. Most frequently mentioned reason: "More money and better fringe bnefits." Of 235 former teachers who moved into industry, the average annual salary was $5,800 for the nine-month teaching year but extras, including summer jobs and consulting fees, brought this up to an annual figure of $7,650. During their first year in industry these same former teachers averaged $9,800 per year. About 80% also said they hoped to go back to teaching, qualifying their remarks with the implied indictment, "When I can afford to return."

This is burning the educational candle at both ends, right at the time when society is demanding more and more highly qualified, professionally trained engineers and scientists. We need better teachers and more students and it is doubtful if we can wait for the law of supply and demand to enforce remedial action. There is too much of a time lag between grammar school and baccalaureate. At the pace with which world technology is moving, an eight-year lag in the quantity of quality of engineering graduates could be suicidal, economically and politically.

Convention sessions . . .

. . . Sociability . . .

. . . Prizes . . .

. . . Thoughtful people

Luau

One of the most pleasurable moments in the '59-60 convention season was the luau pictured on the cover. A courtesy of the Hawaiian Electric Co., the luau is social highlight of the Hawaiian PCEA conference. Amidst orchids, ginger and anthurium can be seen the friendly talks—the horizontal communications that bind our industry together.

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S. Established 1887

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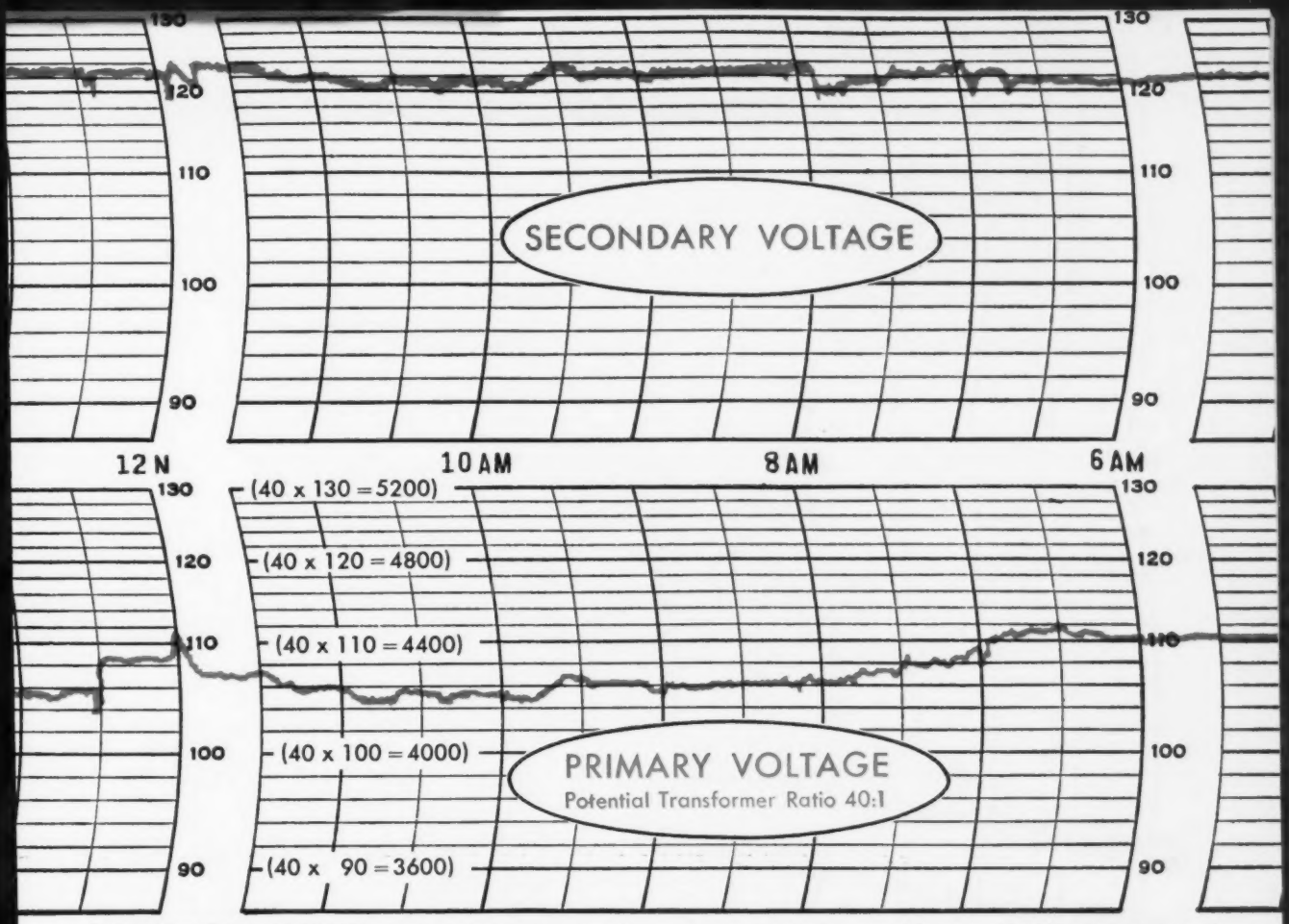


THESE VOLTAGE METER CHARTS were recorded between 6 A.M. and 12 noon on an average work day. Although the primary voltage varied between 4160 volts and 4500 volts, the output voltage of the SRT remained between 120 and 124 volts.

L-M SRT® Provides Simple Solution For Regulation at Industrial Plant

Recognizing SRT as an engineering development and realizing its possibilities for future customer requirements, Cleveland Electric Illuminating Company installed a Line Material SRT (Self-Regulating Transformer) at the end of a primary feeder.

A 37½ kva load was supplied to an industrial plant by one of Cleveland Electric Illuminating Company's 4340 volt primary feeders. This plant was located on the last third of the feeder and was subjected to variations in primary voltage. As in all industrial loads, the demand factor further complicated the situation. This 3-wire, single-phase, 120/240 volt load had primary voltage variation between 4160 volts and 4500 volts during the working day.

Cleveland Electric Illuminating Company decided to try a test installation of a Line Material SRT. The Adapt-a-Tap range was selected to permit fully automatic control within a primary voltage band in excess of 8 percent. The midpoint was set at 121 volts with a band width of four volts.

After the SRT was installed, the metered secondary voltage of this industrial load remained within the band from a fraction of a volt less than 120 volts to a fraction of a volt more than 124 volts, while metered primary voltages varied between 4160 volts and 4500 volts.

Get Data on the SRT

Line Material's SRT can solve an unlimited number of regulation problems where the solution is most imperative *at the load*. For information on how the SRT can solve your regulation problems, contact your L-M Field Engineer; or write Line Material Industries, Milwaukee 1, Wisconsin.

THIS 37½ KVA SRT was installed in a vault adjacent to the industrial plant. Secondary runs were short and voltage regulation with the SRT was improved.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY
Distribution Transformers

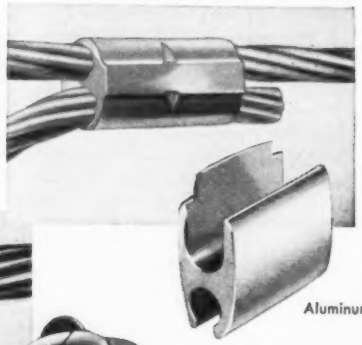
McGRAW EDISON

This is L-M's Transformer Silver Anniversary

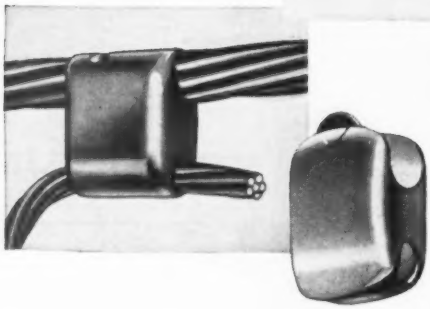
421

KEARNEY

today's
tomorrow's loads demand

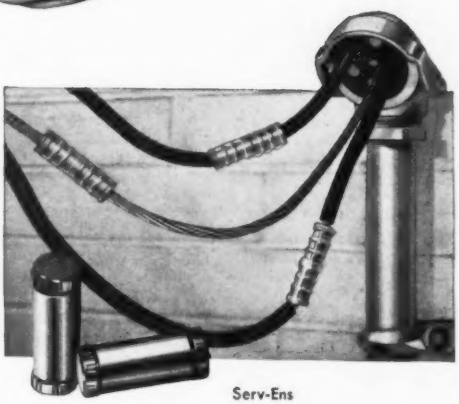


Aluminum Squeezons

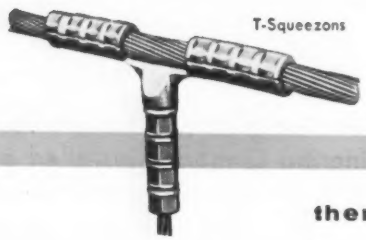


Copper Squeezons

Tension Splicing Sleeves
and Jumper Sleeves



Serv-Ens



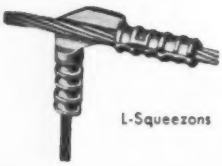
T-Squeezons

there's a KEARNEY compression fitting for almost every

Insulated Splices

Bolted Jumper Sleeves

Compression
Terminals



L-Squeezons

L-Squeezon Stirrups

Ground Rod Fittings

Ground Lugs

for better construction – safer maintenance
– specify KEARNEY products

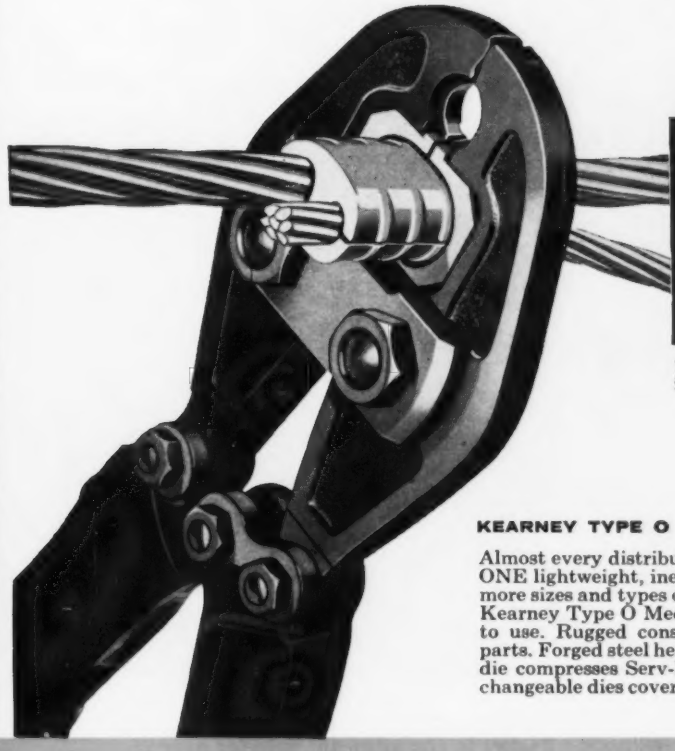
KEARNEY compression fittings

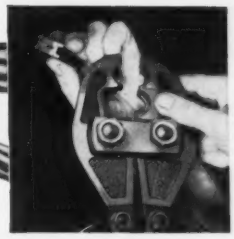
Solve distribution system connection problems with Kearney Compression Fittings . . . get lasting, dependable connection performance under the most rugged operating conditions. Kearney Compression Fittings assure uniformly correct contact pressure, eliminate burndowns and insure extra-long connection life in severely contaminated atmosphere. They prevent contact surface corrosion, eliminate loose or unreliable connections . . . reduce costs. Consider the advantages and economy of Kearney Compression Fittings; write or ask our field representative for more information.

Kearney WH-1 Hydraulic Tool

Fast . . . powerful . . . easy to use. From wide open dies to full compression in less than 20 strokes. Twist of the wrist retracts die or sets tool to make compression. Narrow head for full visibility of work area. Balanced weight for easy positioning. Interchangeable handles available for hot line work.

...applied with KEARNEY compression tools



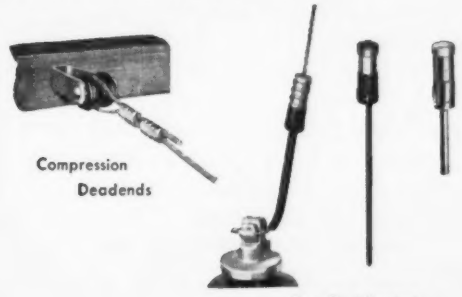


Dies may be easily snapped in or out with fingers only

KEARNEY TYPE O MECHANICAL TOOL

Almost every distribution connection can be made with this ONE lightweight, inexpensive tool. In addition to installing more sizes and types of fittings than tools with fixed dies, the Kearney Type O Mechanical Tool is faster, easier and safer to use. Rugged construction throughout—no complicated parts. Forged steel head, heat treated for high strength. Nose die compresses Serv-Ens and L-Squeezons. Fourteen interchangeable dies cover a wide range of connection fitting jobs.

connection requirement



Compression Deadends

Serv-En Adapters

these 3 easy steps insure trouble-free electrical connections:

1. Use Kearney Conductor Cleaning Brush to remove corrosion.
2. Apply Kearnalex to aluminum contact surfaces immediately after cleaning to exclude air and moisture . . . maintain maximum efficiency contacts.
3. Seal the connection against moisture and contaminants with Kearney Airseal.

JAMES R. KEARNEY CORPORATION

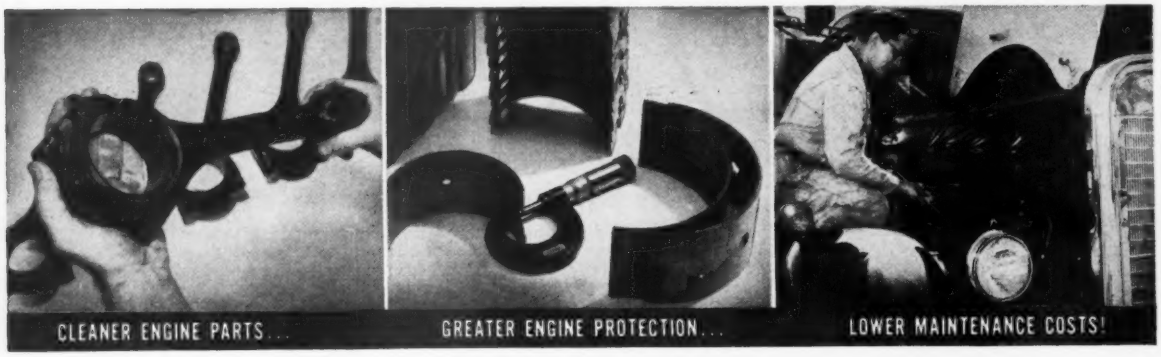
GENERAL OFFICES: 4224-42 CLAYTON AVE. • ST. LOUIS 10, MISSOURI

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, Maydwell and Hartzell, Inc., Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix

Plants at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

NOW-YOU GET CLEANER ENGINE PARTS, LONGER ENGINE LIFE BECAUSE OF THIS MAJOR ADVANCE IN LUBRICATING OILS

SUPER RPM DELO SPECIAL



RPM DELO Oils have been quality leaders in the lubricant field for over 25 years—the most popular dual-purpose engine lubricants ever developed.

Now, Super RPM DELO Special Lubricating Oil sets a new standard of quality. Developed ahead of diesel engine design, it upgrades performance in your diesel and heavy duty gasoline engines—thoroughly tested in the laboratory and under the most severe field conditions. It is particularly effective for mixed fleet operations.

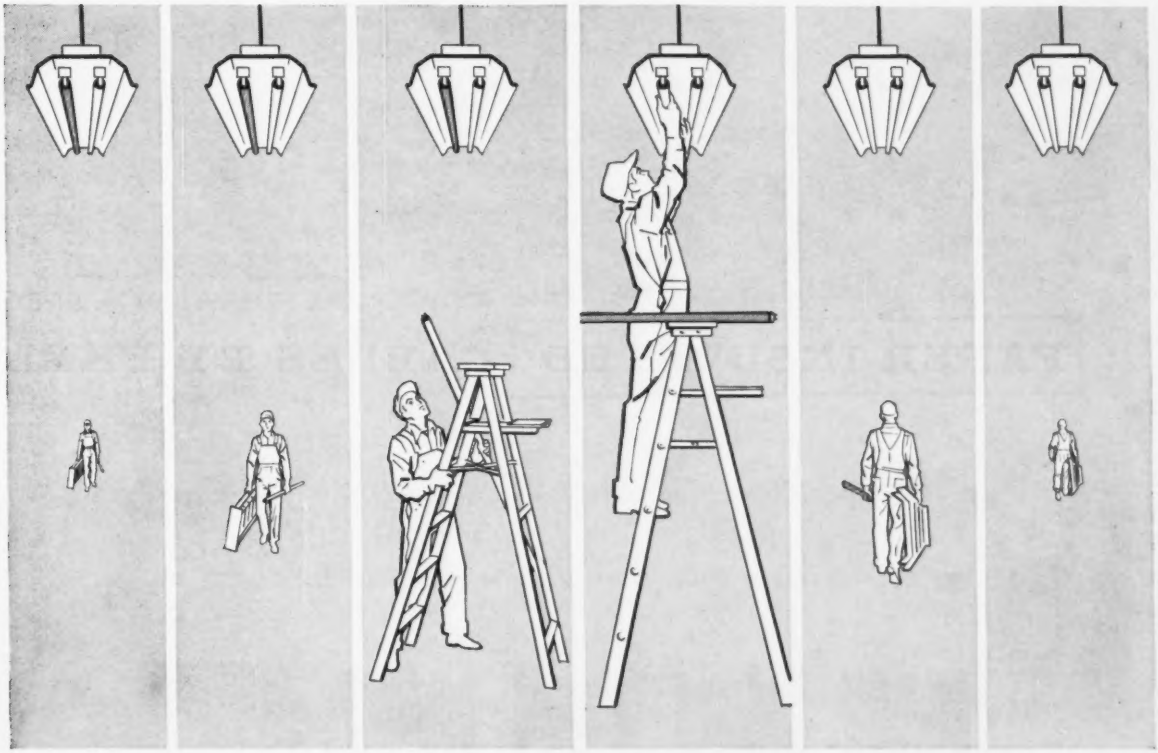
Super "RPM DELO" Special is compounded with Detergent-Action additives, corrosion and oxidation inhibitors and defoaming agent. These built-in properties more than double its over-all compounding effectiveness, assure cleaner pistons, rings, and valve lifters, greater engine protection. In performance it surpasses Supplement #1 level oil and results in longer trouble-free engine life with lower maintenance costs.

For real engine economy, ask your Standard Engineer or local Representative about Super "RPM DELO" Special, *or write Standard Oil Company of California 225 Bush St., San Francisco 20.*

STANDARD OIL COMPANY OF CALIFORNIA

For phone number of closest representative see advertising index in back of book.

How long does it take him to replace one lamp?



TWENTY MINUTES! That's the average time it takes to replace one lamp. First the phone call for maintenance, then the requisition, lamp, ladder, hike to the site, lamp replacement, the walk back, disposal of old lamp, put ladder away. And work interruptions among other employees, caused by one-at-a-time lamp replacements are an expensive item not included.

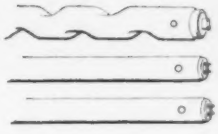
This General Electric Plan can save your customers 26 hours labor on every 100 lamps!

It takes a man about 33 hours to replace 100 lamps if he does it one-at-a-time . . . and less than 7 hours if he does it with this modern General Electric Plan for group relamping. That's a cut-and-dried savings of 26 hours for every 100 lamps your customer uses. Twenty-six times the hourly cost of one maintenance man!

But there's more! With this plan a customer also gets up to 25% more light, 75% fewer work interruptions, 75% fewer buying and stocking headaches . . . and a better looking lighting system.

Records prove this simple plan works best with General Electric Lamps. Why? Because they have a more uniform lamp life. They last most customers well over 2 years . . . with fewer early burnouts. What's more, the plan has a built-in reminder that eliminates record-keeping—tells when it's time to begin another cycle. *Right now* is the best time for you to suggest this money-saving system to each of *your* customers. General Electric Co., Large Lamp Dept. C-022, Nela Park, Cleveland 12, Ohio.

G-E LAMP UNIFORMITY MAKES GROUP RELAMPING PRACTICAL



Powerful Power Groove
Mighty Premium 3
Economical F-40

Progress Is Our Most Important Product

GENERAL ELECTRIC

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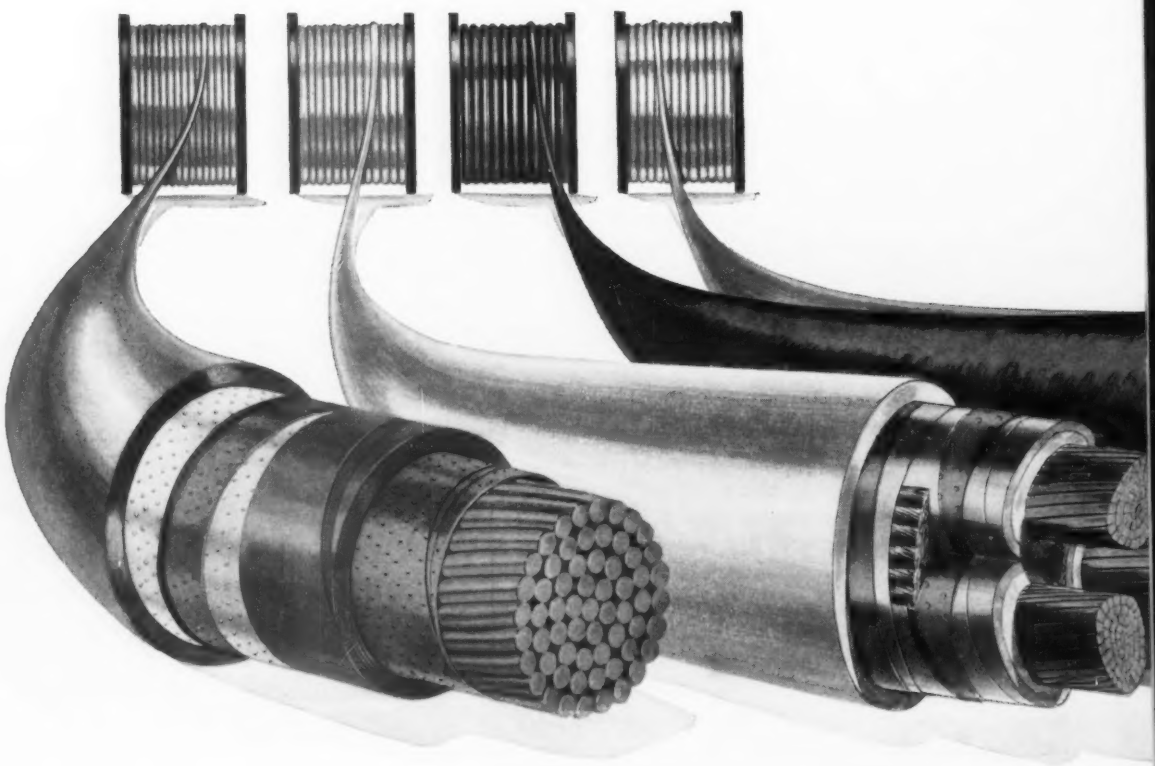
FOR THE MOST EFFICIENT
POWER DISTRIBUTION . . . SPECIFY

PAPER-INSULATED CABLES BY PHELPS



Single conductor, 1 KV and up

Three-conductor, 1 KV and up

For phone number of closest representative see advertising index in back of book.

Phelps Dodge paper-insulated power cables have a *demonstrated record* of long life in a great variety of designs for all types of applications—underground duct, direct burial, submarine and aerial.

Paper-insulated cables have these important inherent characteristics that improve operating performance and lengthen service life:

- Extra high 60-cycle and impulse strength to withstand switching and lightning surges.
- Ability to handle large blocks of power in single cables of minimum dimensions.
- Positive protection against all contaminations, due to being hermetically sealed in an extruded metallic sheath.

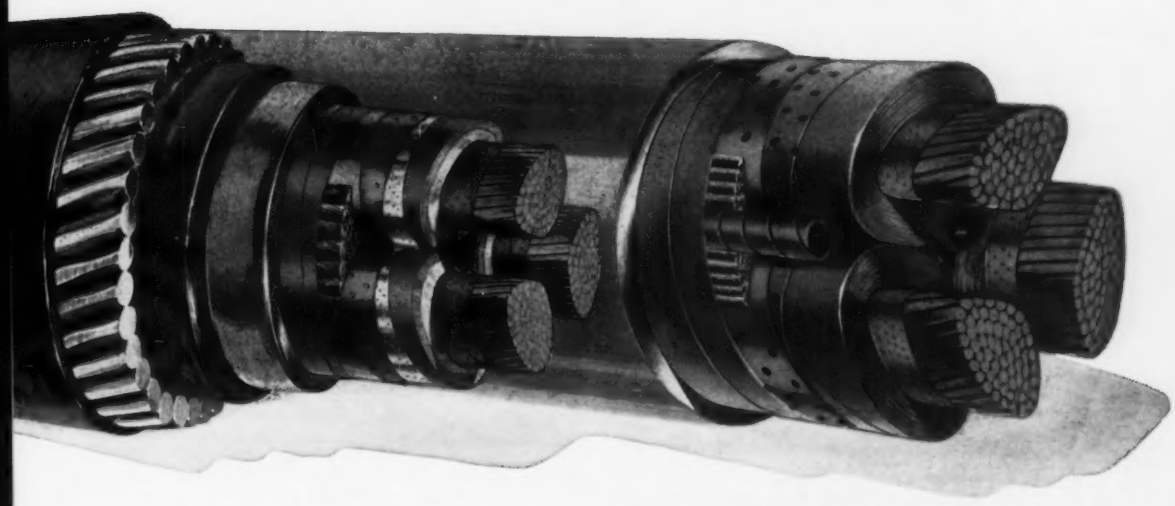
Paper-insulated cables can be supplied with either lead or aluminum sheaths.

Phelps Dodge offers the widest range of high voltage cables to the electrical industry.

DODGE!

PHELPS DODGE COPPER PRODUCTS CORPORATION

300 PARK AVENUE, NEW YORK 22, NEW YORK



Submarine, 1 KV and up

Low-Pressure gas-filled, 8 KV and up

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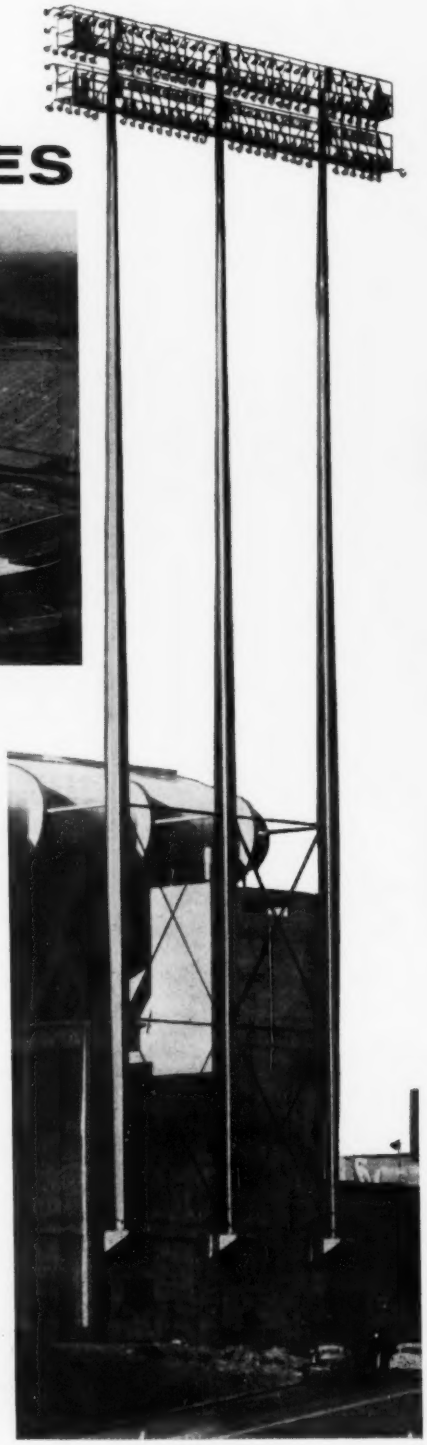
To floodlight Giants' Stadium,
WELD-RITE *builds the world's*

TALLEST LIGHT POLES



When the San Francisco Giants take the field for night games at Candlestick Point Stadium, they'll play under floodlights from ten 195 ft. and twelve 130 to 155 ft. high poles, specially fabricated by Weld-Rite. These are believed to be the world's tallest poles for floodlighting.

Twenty-six other Weld-Rite poles, 30 to 60 ft. high, will provide light bright-as-day in parking areas.

Like the Giants, you, too, will find it pays to light up with Weld-Rite. No matter what your lighting need—whether it be 10 ft. poles for traffic lights, or towering giants for floodlighting—call on us for help.

All Weld-Rite poles meet, or exceed, EEI-NEMA specifications. And, thanks to manufacturing in the West you can have deliveries to fit even tight job schedules.

For counsel on type of lighting system, lighting source, spacing, costs, etc., call or write our nearest office. Fully illustrated catalog also available. No obligation.

Note placement of Weld-Rite floodlight standards, behind spectators' seats, at Candlestick Point Stadium, so playing field and view is unobstructed.

WR CO.

WELD-RITE COMPANY
Only active manufacturer of round tapered steel poles in the West

4417 Oakport Street
Oakland, California
ANdover 1-3341

416 West 8th Street
Los Angeles, California
MAdison 4-9338

7

For phone number of closest representative see advertising index in back of book.

ALL THE ADVANTAGES OF A "VISE-TYPE" CONNECTOR FOR HOT LINE INSTALLATION

FIELD PROVEN "VISE-TYPE" DESIGN

. . . no loose parts to handle.

. . . protected threads assures easy removal.

. . . vibration proof interlocking of parts for long service.

. . . high conversion of applied bolt torque to clamping force.

DESIGNED FOR ALUMINUM AND ACSR

. . . extra long, parabolic shaped jaws gives better contact on conductors.

. . . low interstrand resistance assured by exerting clamping force on all strands.

. . . large mass rapidly dissipates heat holding conductor temperatures down.

. . . suitable for use on bi-metal connections when protected with liberal application of Fargolene Fourteen, a corrosion inhibitor.

PURE ALUMINUM SPACER

. . . direct, short, high conductivity path between conductors for low joint resistance.

. . . low resistance joint, long contact areas, good conductor encirclement permits heavy duty use.

. . . ears of spacer easily formed to securely hold tap in position.

EASILY INSTALLED

. . . "BC-Series" connectors are quickly installed with standard hot line tools by one man.

STIRRUPS ("BC-AHS SERIES")

. . . preformed and factory installed copper rod with heavy hot tin plating, makes use of either bronze or aluminum clamps possible.

Ask your line Material Field Engineer for complete details.

Patented

Distributed by
LINE MATERIAL INDUSTRIES
McGraw-Edison Company
Milwaukee, Wisconsin

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie
New York

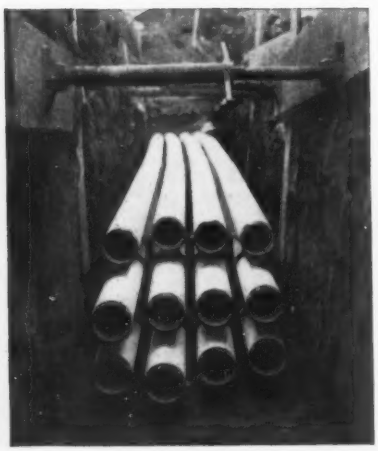
FARGO

For phone number of closest representative see advertising index in back of book.

Get peak cable protection ***at lowest dollar cost***

Transite Ducts can be laid directly in trench without concrete envelope. Or if ductbank is to be concrete enclosed—thinner walled Transite Duct may be used. In all other respects both heavy-wall and thin-wall Transite Ducts are identical.

Transite Ducts save on the job and after!



No other duct material gives you so many installation and in-service economies

In every way, Transite® Ducts are the most efficient electrical ducts you can install. And—when assembled with J-M's Plastic Coupling—their cost is remarkably low!

One reason for this economy is in installation. Strong, lightweight, long—Transite lengths are easy to handle and install . . . Your men set the ducts in place easily, join them tightly in seconds. Transite's smooth bore is free of burrs and obstructions. Thus, long cable pulls are easily accomplished with no damage to cable sheathing.

You see another reason for Transite's economy in performance. Once in service, Transite's unusually high rate of heat dissipation means cables run cooler, last longer. Transite also confines arc damage . . . cannot burn, smoke or fume. It won't generate explosive or toxic gases. If arcing does occur, Transite Ducts won't sag or adhere to cable.

Let us send the Transite Duct brochure EL-29A. Write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JOHNS-MANVILLE JOHNS MANVILLE JM PRODUCTS

For phone number of closest representative see advertising index in back of book.

ALLIS-CHALMERS

One of three 96-inch **Howell-Bunger** valves in operation at the U. S. Engineers Mud Mountain Dam, White River, Wash.

2 ways to air-cushion a big splash

...and provide easy regulation of free discharge

***Howell-Bunger* valves** produce an expanding, aerated water jet that dissipates tremendous energy with minimum erosion and cavitation — and virtually no vibration. They're ideal for free discharge with high to low heads, into atmosphere or water. Lowest in initial cost... economical to install (need pipe line or conduit of *minimum* size). Only one moving part in contact with flow.

***Ring-Jet* valves** yield a concentrated, aerated jet, perfect for locations requiring reduced spray. A logical development from the *Howell-Bunger* valve, they offer many parallel advantages ... are equally suited to high and low heads.

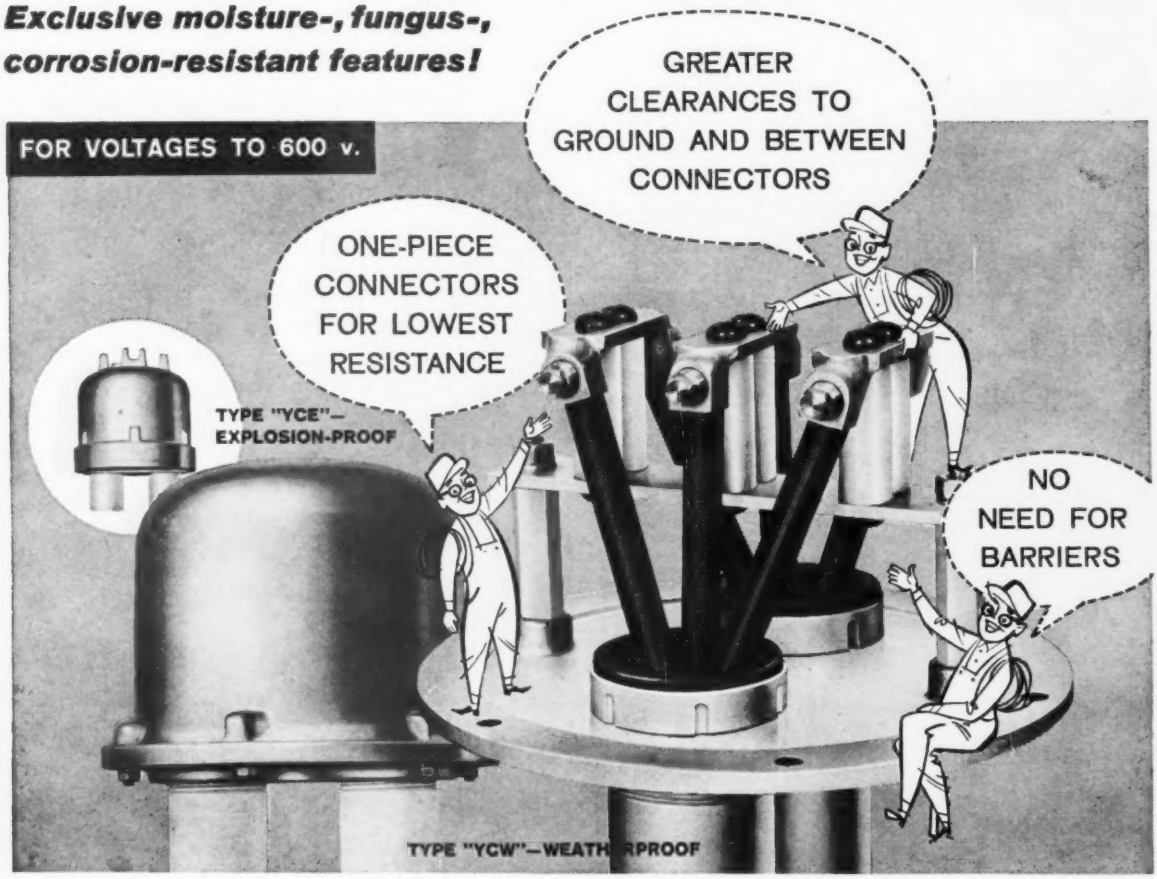
Only Allis-Chalmers is geared to equip complete hydro installations — turbines, generators and auxiliaries. Contact our office in your area for information. Or write **Allis-Chalmers,** *Hydraulic Division, York, Pennsylvania.* A-1256

One of two RING JET valves used for irrigation bypass from Tulloch Dam, California.

For phone number of closest representative see advertising index in back of book.

NEW! O.Z. PULL-N-SPLICE BOXES!
CONVENIENT·COMPACT·ECONOMICAL

Exclusive moisture-, fungus-, corrosion-resistant features!


FOR VOLTAGES TO 600 v.
GREATER CLEARANCES TO GROUND AND BETWEEN CONNECTORS
ONE-PIECE CONNECTORS FOR LOWEST RESISTANCE
TYPE "YCE"— EXPLOSION-PROOF
NO NEED FOR BARRIERS
TYPE "YCW"—WEATHERPROOF

O.Z. Pull-n-Splice Boxes mark a significant advance in pull box construction!

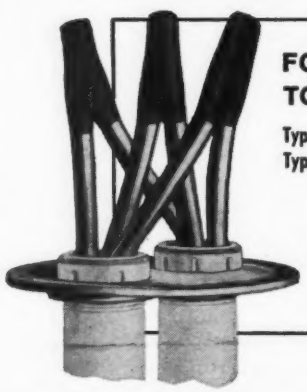
Their highly compact size saves *more space than ever!*

Their more efficient design means *new savings in installation time and labor!*

Their moisture-, fungus-, and corrosion-resistant features mean long, trouble-free service.

Still, with all their features, the new O.Z. Pull-n-Splice Boxes are *smaller* — and *cost far less* than conventional pull boxes . . . even late model *competitive* types! And, you get a bonus in high quality materials and workmanship so characteristic of *all* O.Z. products!

For complete information on these and the many other O.Z. products that mean more for you, call your local O.Z. distributor, or write to the company.



FOR VOLTAGES TO 5000 v.

Type "YPW" — Weatherproof
Type "YPE" — Explosion-proof

Deeper dome than "YCW" and "YCE". Furnished without connector panels. Insulated pigtail splices recommended.

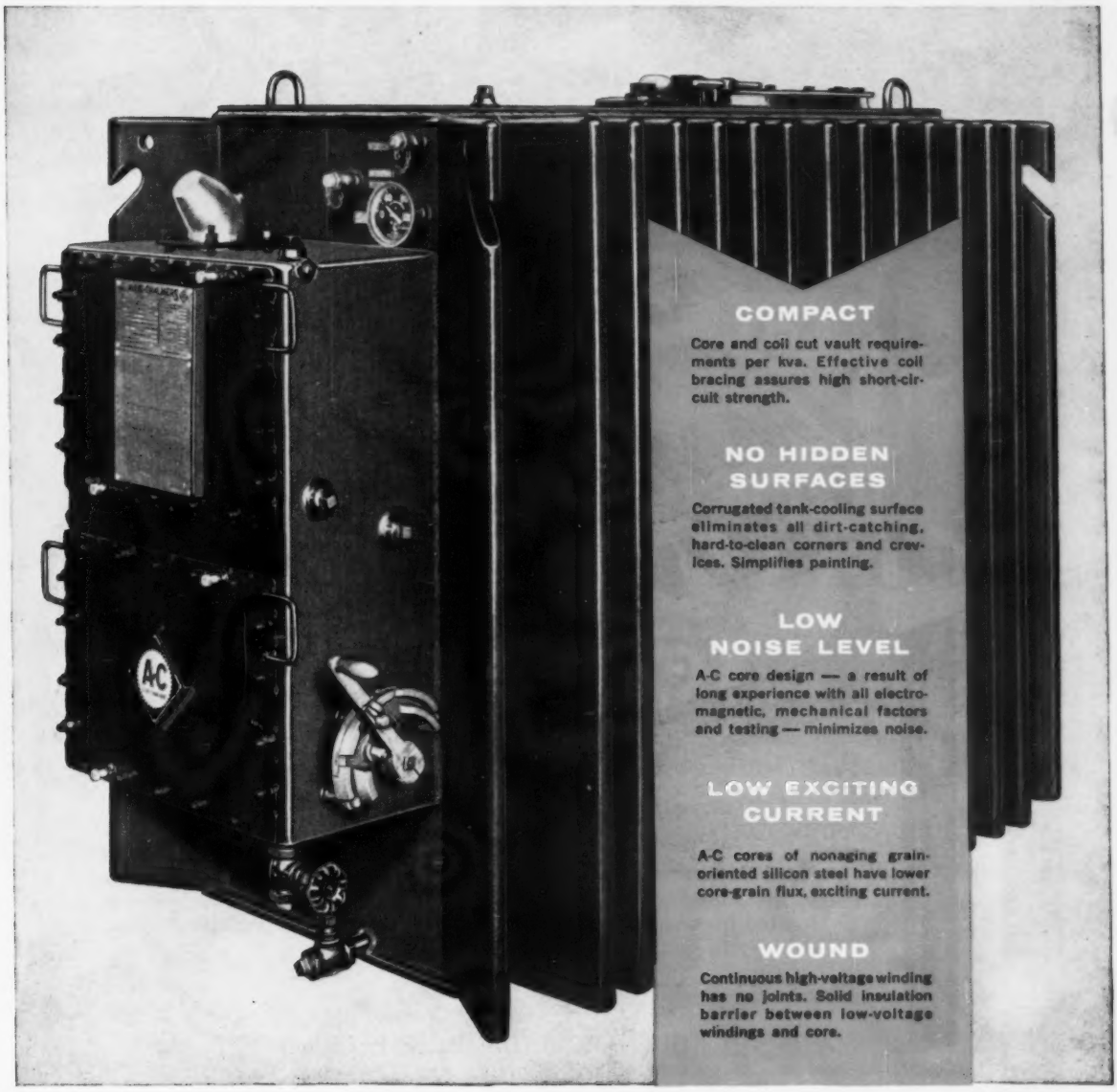
O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET • BROOKLYN 17, N. Y.

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Sales Office and Warehouse: 406 So. Cicero Avenue, Chicago 44, Ill. • ESterbrook 9-0326
Office and Factory: 749 Bryant Street, San Francisco 7, Calif. • GArfield 1-7846

ALLIS-CHALMERS


COMPACT
Core and coil cut vault requirements per kva. Effective coil bracing assures high short-circuit strength.
NO HIDDEN SURFACES
Corrugated tank-cooling surface eliminates all dirt-catching, hard-to-clean corners and crevices. Simplifies painting.
LOW NOISE LEVEL
A-C core design — a result of long experience with all electromagnetic, mechanical factors and testing — minimizes noise.
LOW EXCITING CURRENT
A-C cores of nonaging grain-oriented silicon steel have lower core-grain flux, exciting current.
WOUND
Continuous high-voltage winding has no joints. Solid insulation barrier between low-voltage windings and core.

Network news! smaller, vault-saving size

Smaller, lighter, more efficient — these advances mark the latest Allis-Chalmers network transformer developments. They're reliable, compact powerhouses — whisper-quiet performers.

And how they save you money! Reduced dimensions make them easier to handle, easier to lower into smaller, economy vaults. Your labor, equipment rental and operating costs nosedive.

Consider this, too! A new A-C network in an existing vault "opens up" previously tight quarters, eases routine inspections. Welded main cover ends gasket maintenance . . . bushings are easily replaced from outside in event of damage.

• • •

Whether you're thinking about a new or replacement network transformer, see your nearby A-C office and save money. Or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1317

Need Copperweld Ground Rods or Clamps in a hurry? Just contact any of the following Pole Line Hardware Manufacturers or their Jobbers—located from coast to coast. They have large stocks available for quick delivery to you.

A. B. CHANCE COMPANY
210 N. Allen St., Centralia, Mo.

HUBBARD AND COMPANY
200 S. Michigan Ave., Chicago 4, Ill.

JOSLYN MFG. AND SUPPLY COMPANY
155 Wacker Dr., Chicago 6, Ill.

LINE MATERIAL INDUSTRIES
700 W. Michigan St., Milwaukee 1, Wis.

OLIVER ELECTRICAL MFG. COMPANY
170 Angell St., Battle Creek, Mich.

Millions of Copperweld Ground Rods—the only molten-welded rods—are in use protecting billions of dollars worth of equipment.

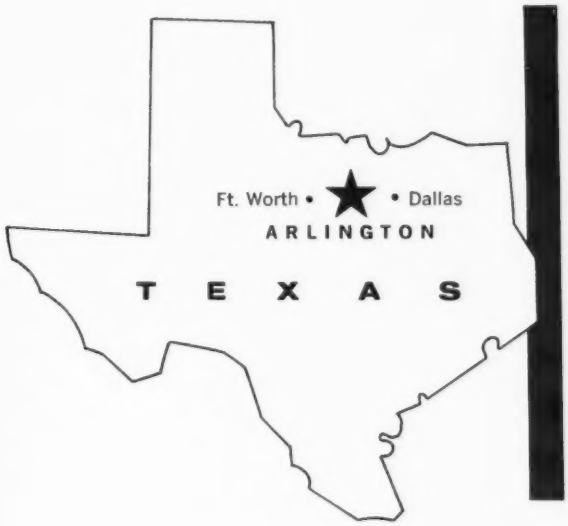
COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, N.Y.

For phone number of closest representative see advertising index in back of book.

RT&E grows to better serve the growing South and Southwest

NOW IN OPERATION....

another new RT&E manufacturing plant—in Arlington, Texas!



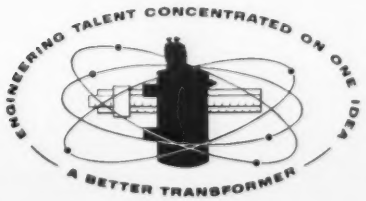
RT&E Corporation is proud to be the first major distribution transformer manufacturer to locate in the great South and Southwest.

Centered in the heart of this growing area, the Arlington, Texas plant with its latest, up-to-date equipment will provide immediate service and delivery for transformer users in seven states. In addition to manufacturing, Arlington adds another branch warehouse to RT&E's rapidly expanding nation-wide service network.

The new Arlington manufacturing plant, RT&E's third, is part of a carefully planned expansion program to provide the fastest service and delivery of the finest distribution transformers built.

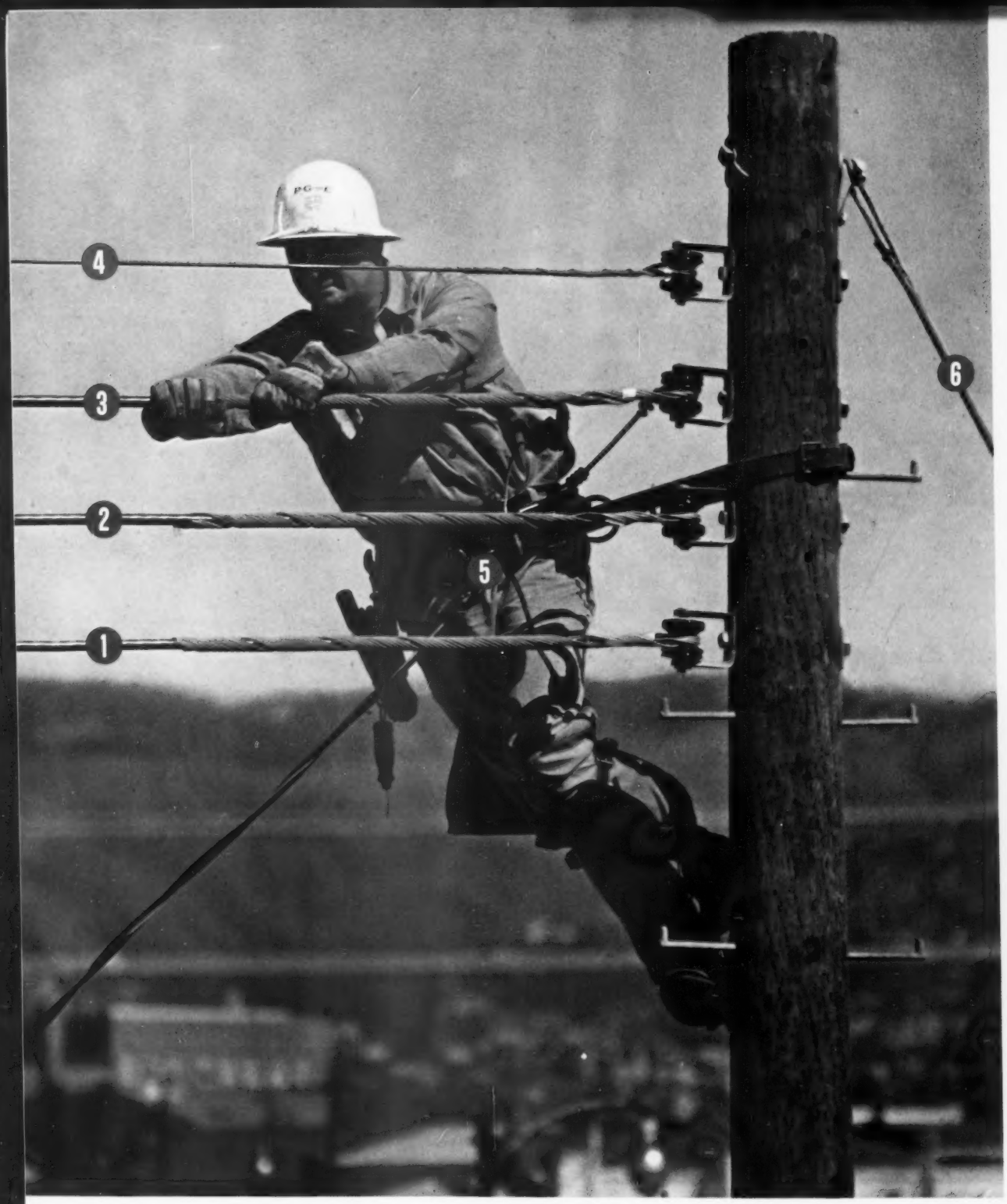
RT&E Corporation

WAUKESHA, WISCONSIN
PORTLAND, OREGON
ARLINGTON, TEXAS



RR

For phone number of closest representative see advertising index in back of book.



1 – 3 Preformed NADEs on secondary application—Polyethylene Covered All-Aluminum conductors, size 397.5 MCM being installed by Pacific Gas & Electric Company.

4 Preformed NADE on Polyethylene Covered All-Aluminum street lighting circuit.

5 Preformed Dead-End for Triplex bare neutral application.

6 GUY-GRIP dead-end for $\frac{3}{8}$" galvanized steel strand.

USE *Preformed* TRADEMARK

NEOPRENE-COATED DEAD-ENDS FOR WEATHERPROOF CONDUCTORS COVERED WITH NEOPRENE OR POLYETHYLENE

With *Preformed* TRADEMARK Neoprene-Coated Dead-Ends (NADEs), the jacketing on the conductor remains intact. Labor and potential corrosion problems are reduced. No bulky fittings to be taped.

NO FEAR OF CAPACITANCE EFFECT, which can break down the covering, thereby creating NOISE; also reduce the mechanical holding strength.

NO STRIPPING OF THE COVERING, therefore **NO EXPOSURE OF THE BARED CONDUCTOR TO CORROSION** from coastal or industrial contamination.

NO DAMAGE TO CONDUCTOR JACKETING from bending the conductor around the hardware.

NO EMBEDMENT. Low localized radial pressures are distributed over wide area to develop maximum holding strength.

NO WEDGING DEVICES AND HIGH CONCENTRATED STRESSES. Groups of individual wires, bonded together with Neoprene, create bands which gently grip the conductor along the entire contact length of the *Preformed* TRADEMARK Dead-End.

Tapping to conductor tails.

ARE YOU WONDERING
HOW MANY *Preformed* TRADEMARK
NEOPRENE-COATED DEAD-ENDS
HAVE BEEN PURCHASED
DURING THE PAST THREE YEARS?

Here's The Answer:

139 ELECTRIC UTILITIES have purchased nearly 300,000

PREFORMED LINE PRODUCTS COMPANY

5349 St. Clair Avenue • Cleveland 3, Ohio
600 Hansen Way • Palo Alto, California

is a trademark which is registered in the U.S. Patent Office and is the property of Preformed Line Products Company.

PREFORMED and GUY-GRIP are additional trademarks of Preformed Line Products Company.

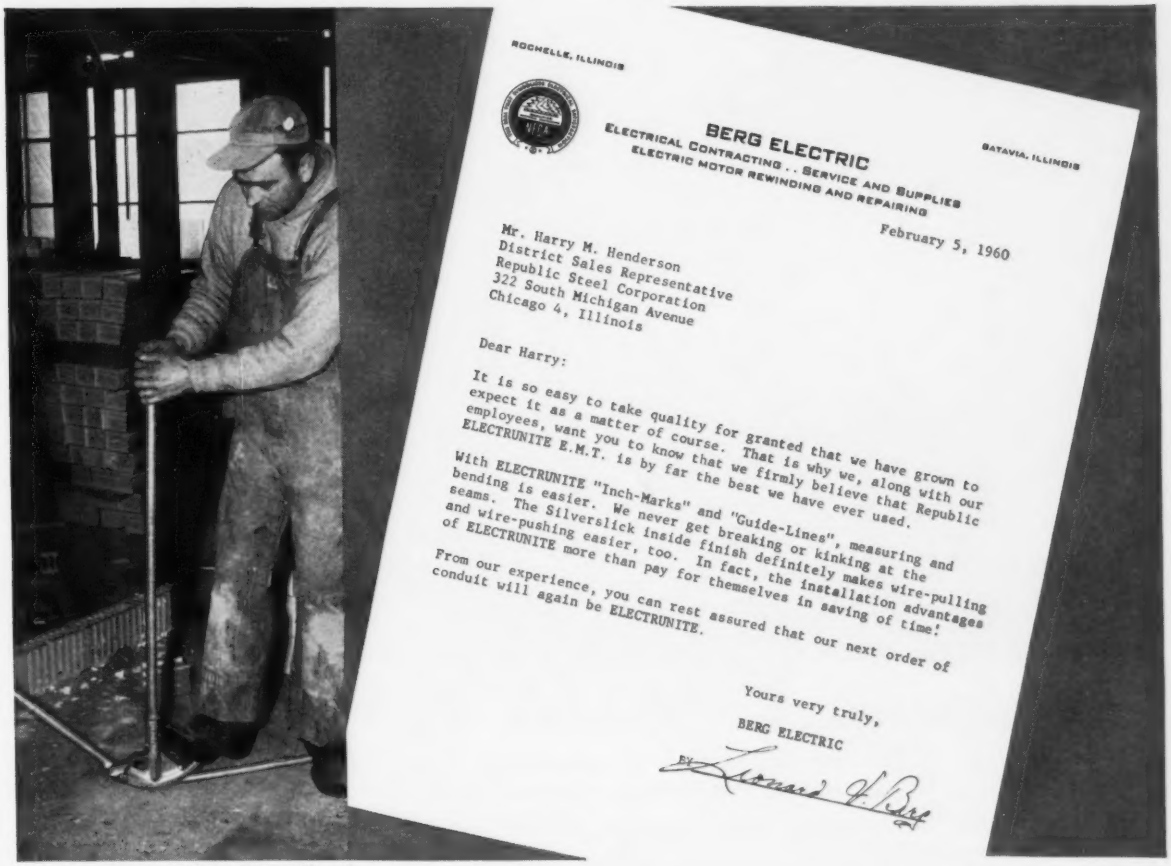
Patented — U.S. Patent Number 2,761,273

"More than pays for itself"

Republic ELECTRUNITE Electrical Metallic Tubing because...

THE BEST COSTS LESS INSTALLED

The best testimonial for Republic ELECTRUNITE® Electrical Metallic Tubing is a satisfied user. Leonard V. Berg, Berg Electric, with locations at Batavia, and Rochelle, Illinois, recently completed two major installations using ELECTRUNITE E.M.T. on the job. His letter tells why... The *Best* Costs *Less* Installed!



ROCHELLE, ILLINOIS

BERG ELECTRIC

ELECTRICAL CONTRACTING .. SERVICE AND SUPPLIES
ELECTRIC MOTOR REWINDING AND REPAIRING

BATAVIA, ILLINOIS

February 5, 1960

Mr. Harry M. Henderson
District Sales Representative
Republic Steel Corporation
322 South Michigan Avenue
Chicago 4, Illinois

Dear Harry:

It is so easy to take quality for granted that we have grown to expect it as a matter of course. That is why we, along with our employees, want you to know that we firmly believe that Republic ELECTRUNITE E.M.T. is by far the best we have ever used.

With ELECTRUNITE "Inch-Marks" and "Guide-Lines", measuring and bending is easier. We never get breaking or kinking at the seams. The Silverslick inside finish definitely makes wire-pulling and wire-pushing easier, too. In fact, the installation advantages of ELECTRUNITE more than pay for themselves in saving of time!

From our experience, you can rest assured that our next order of conduit will again be ELECTRUNITE.

Yours very truly,
BERG ELECTRIC
By Leonard V. Berg

"With ELECTRUNITE "INCH-MARKS"® and "GUIDE-LINES"®, measuring and bending is easier."

REPUBLIC STEEL

STEEL AND TUBES DIVISION

REPUBLIC STEEL

Cleveland 8, Ohio

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • DEPT. C-9548-A
216 EAST 131st STREET • CLEVELAND 8, OHIO

I want to know more about the installation advantages of Republic ELECTRUNITE Electrical Metallic Tubing.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

For phone number of closest representative see advertising index in back of book.

fully adjustable, TUBULAR BUS SUPPORT*

This bus support, made of high-strength bronze throughout, has the following outstanding features:

- Fully adjustable to any angle whatsoever within a complete circle (360°).
- No need to lift bus out of support to change angular position.
- To change position within seconds, merely loosen 4 insulator mounting bolts, rotate assembly to desired angle and re-tighten bolts.
- No inaccessible internal bolt employed for angular setting.
- The only bus support whose angular adjustment does not jeopardize its overall strength.
- By reversing cap bus can be tight-mounted or slip-mounted.

Write for illustrated brochure!

***U. S. PAT. 2,861,762**

50 YEARS OF SERVICE

DOSSERT MFG. CORP.

249 Huron Street, Brooklyn, New York

Representatives in principal cities.

Distributed outside the U.S.A. and Canada by

INTERNATIONAL GENERAL ELECTRIC COMPANY

Construction Materials and Lighting Sales

150 East 42nd Street

New York 17, N. Y., U.S.A.

For phone number of closest representative see advertising index in back of book.

how good should power cable be

...*for long term stability?*

It isn't enough to meet or barely surpass specifications—not when it is possible to build maximum performance into power cable—as Circle does. Take, for example, the IPCEA-NEMA 60 cycle water absorption test.

Circlesheath® Type RR Power Cable Performance

In the IPCEA-NEMA "Accelerated Water Absorption Tests," Section 6.9, a sample of power cable is immersed in 50°C water for a period of 14 days during and after which time specific inductive capacity and stability factor are measured.

Not only does Circle butyl-insulated power cable far surpass all minimum specifications after 14 days immersion—*but continues to do so after one year and eight months of continuous immersion. And the test is still going on!*

Date of original immersion: September 1958 Date of last test: April 1960

CABLE DESCRIPTION: 15KV, UNGROUNDED, SHIELDED	CIRCLESHEATH® CHANGE SIC	PERFORMANCE STABILITY FACTOR
700,000CM	4.3%	.6%
300,000CM	3.9%	.5%
300,000CM	3.6%	.4%

IPCEA-NEMA Requirements: Change SIC 1 to 14 days: 5% max.— stability factor after 14 days: 1% max.

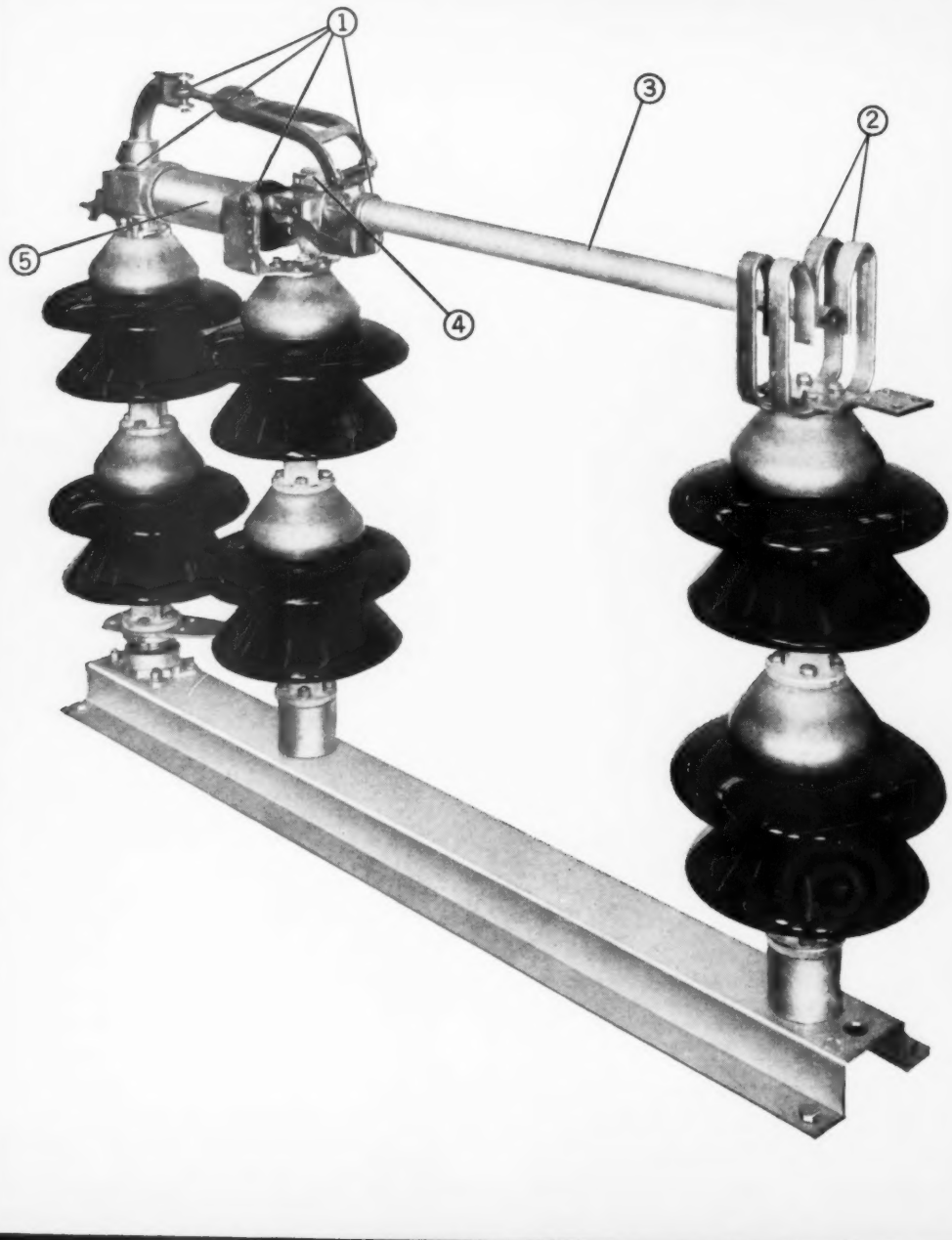
Circle's school for production men means better products for wire and cable users. Here laboratory technicians lecture on such subjects as extruding techniques, optimum operating speeds, testing procedures, etc.

The manufacture of high-reliability power cable is no accident. It requires expert knowledge of compounding techniques, absolute quality control—and production men who not only care enough . . . but *know enough* to produce the very best.

CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

RUBBER COVERED WIRE & CABLE • VARNISHED CAMBRIC CABLE •
PLASTIC INSULATED CABLE • NEOPRENE SHEATHED CABLE • CIRTUBE® EMT

For phone number of closest representative see advertising index in back of book.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2
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5

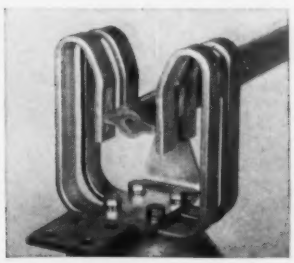
COMPLETELY NEW WESTINGHOUSE V-2 SWITCH PROVIDES TOP PERFORMANCE UNDER TOUGHEST OPERATING CONDITIONS

Another new air break switch? The Westinghouse V-2 air break switch is that—and more! Based on 18 years of continued development on the pace-setting "V" switch, the new V-2 switch is designed functionally to give superior, reliable performance under toughest operating conditions. Here's why:

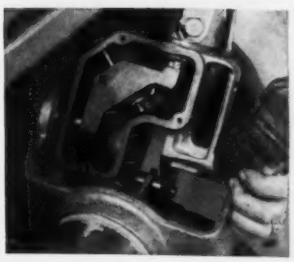
1. **Teflon-coated bushings** on all live-side bearings assure long life, low-friction operation unhampered by corrosion. Teflon-coated ball-and-socket joint between operating lever and blade lever gives smoother operation, longer life.
2. **Reverse-loop break jaw** is one piece, made of high-conductivity zirconium copper.
3. **One-piece, high-conductivity blade** with form-hardened contact tip.
4. **New enclosure** completely protects solid hinge bridging contact . . . yet bridge is easily removed for inspection. Adjustable joint in blade actuating linkage is also completely enclosed and protected.
5. **Counterbalancing mechanism** is enclosed in horizontal, vertical and underhung mountings. Mechanism rides on teflon rollers for longer life, lower operating effort.

The new V-2 switch retains many of the outstanding mechanical characteristics of the pioneering "V" design—rotating insulator bearing recessed in base; universal operating lever on driven pole; and the ability to function positively, safely under adverse atmospheric conditions, including ice.

FOR MORE DETAILS on the new Westinghouse V-2 switch, contact your nearest Westinghouse sales engineer or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60997-R



IMPROVED ELECTRICAL CHARACTERISTICS: The V-2 features a new design, single-piece break jaw of zirconium copper which ups break jaw conductivity to over 90 percent, cuts operating effort. Built-in silver inserts give longer life, corrosion-free contacting. And the reverse-loop break jaw shape, plus positive blade and blade stop coordination, eliminates contact burning under fault conditions.



WESTINGHOUSE PIONEERED SHUNT ELIMINATION with the solid hinge-end bridging contact which is now completely enclosed and protected, yet provides easy accessibility for inspection.

YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

For phone number of closest representative see advertising index in back of book.

SPECIFY CLIFTON CONDUIT

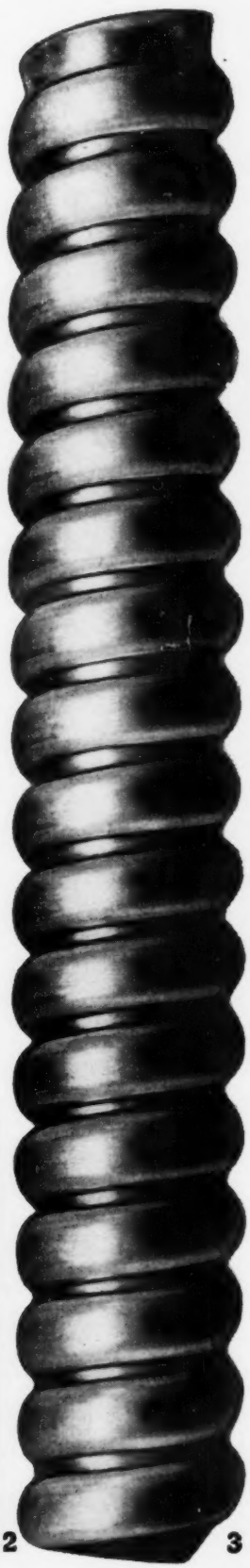
The conduit with built-in quality

1 **EMT** (Electrical Metallic Tubing) the only hot-dipped galvanized tubing—inside and out for complete protection • flat, clean, continuous weld for smooth interior surface and ease of pulling during installation.

2 **RIGID CONDUIT** made of the finest steel available • Clifton's exclusive process for hot-dipped galvanizing guarantees a uniform zinc protective coating . . inside and out • the finest rigid conduit made. Clifton Rigid Conduit is approved by Underwriter's Laboratories, Inc. and conforms with Federal Specification WW-C581C and ASA Specification C-80.1-1953. Clifton EMT is approved by Underwriter's Laboratories, Inc. and conforms with Federal Specification WW-T-806B and ASA Specification C-80.3-1953. RIGID CONDUIT ELBOWS, COUPLINGS, AND NIPPLES in a full range of sizes • are manufactured of the same fine high quality steel as RIGID CONDUIT • hot dipped galvanized inside and out.

3 **FLEXIBLE STEEL CONDUIT** really flexible and crush-resistant for easier and faster installations • manufactured under Clifton's rigid controls from purchase of high quality steel tape to finished product • smooth inside surface assures you trouble free pulling during installation. Clifton Flexible Steel Conduit is approved by Underwriter's Laboratories, Inc. and conforms with Federal Specification WWC-556. Other quality products by Clifton: Bushed Armored Cable; Unarmored Service Entrance Cable; (CLIFTX) Non-Metallic Sheathed Cable; CLIFTALL-UF; Building Wire —TW, RHW, RR.

CLIFTON CONDUIT CORPORATION
A Division of General Cable Corporation
3300 Eastbourne Ave., Baltimore 24, Md.



1 2 3

For phone number of closest representative see advertising index in back of book.

STRIPSEAL

seals in oxide-inhibiting PENETROX®
...on the connector contact surfaces

No Cutting...No Snipping or Ripping...Just a Gentle Pull

TAPIT® with STRIPSEAL makes neat, clean aluminum-to-copper connections.

and your Burndy STRIPSEALED connector is ready to make a trouble-free aluminum connection. STRIPSEAL, the leak-proof, all-weather, plastic cover hugs the connector like a "cocoon"...seals in oxide-inhibiting PENETROX—on the contact surfaces, where it belongs. **It's easy to use**...even with work gloves on. **It's clean**...just dry brush conductor and install the connector; no on-the-job application of oxide inhibitor needed. **It's sure**...lineman can't forget PENETROX. For positive protection of every connection, specify Burndy connectors with STRIPSEAL. Write for full details,

BURNDY

59-18

Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

For UNDERGROUND

Wagner SUBURBAN
PAD MOUNTED TRANSFORMERS
Available in single-phase, 25-167 Kva;
three-phase, 75-500 Kva.

DISTRIBUTION...

WAGNER SUB URBAN TRANSFORMERS

are safe... well-ventilated ...adaptable to future load growth

Plotting a new subdivision? Planning a new shopping center? Reworking, modernizing a distribution system? Write Wagner Sub-Urban Pad Mounted Transformers into your standards.

Wagner Sub-Urban Pad Mounted Transformers are designed to be used wherever underground distribution is necessary or desirable. They are ideal for use in residential areas. Compact in size, low in profile, they can be hidden behind plantings of shrubbery.

Safe to use? Certainly. A padlocked, tamperproof enclosure protects your equipment... protects people. The public is protected from exposed hot-lines... and, your crews are protected, too, by a door over the primary compartment which lets them work on the secondary without danger from high voltage.

Sub-Urban Transformers are well-ventilated... they can be loaded to capacity. When load growth makes it necessary, larger transformers can be quickly and easily installed to replace the original transformer units. These transformers normally require only routine maintenance. Due to better protection, far fewer faults occur in an underground system over a period of time than would generally occur in a comparable overhead system.

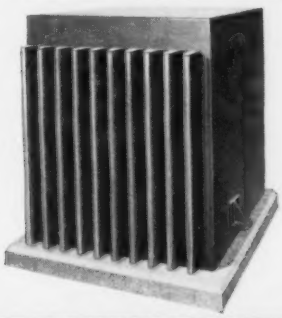
Get the whole story of Wagner Sub-Urban Transformers. Consult your nearby Wagner Sales Engineer, or write for Bulletin TU-148.

Wagner Electric Corporation

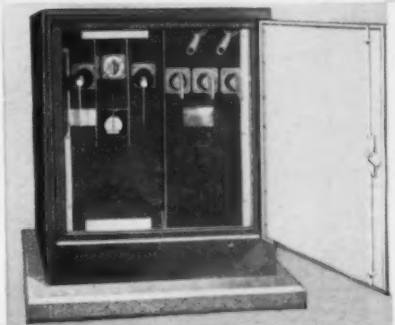
6381 PLYMOUTH AVE., ST. LOUIS 33, MISSOURI

WT60-4

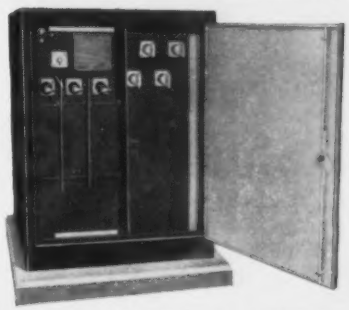
BUILT TO LAST—Tank is of heavy gauge sheet steel, with welded-on cover. Smoothly shaped radiators are welded to tank along their entire length. Complete special asphalt-type undercoating gives lasting protection against rust and corrosion.



SINGLE-PHASE—Terminal cabinet of a 100 Kva single-phase transformer. Barrier plates are provided between high voltage bushings and between high and low voltage compartments. Single-phase ratings from 25 through 167 Kva.

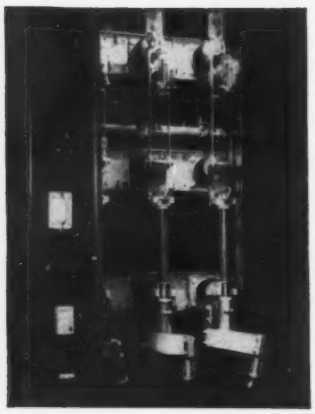


THREE-PHASE—Terminal cabinet of a 225 Kva three-phase Sub-Urban Transformer. High voltage tap changer is at the left side of the nameplate. Three-phase pad units are available in ratings from 75 through 500 Kva.

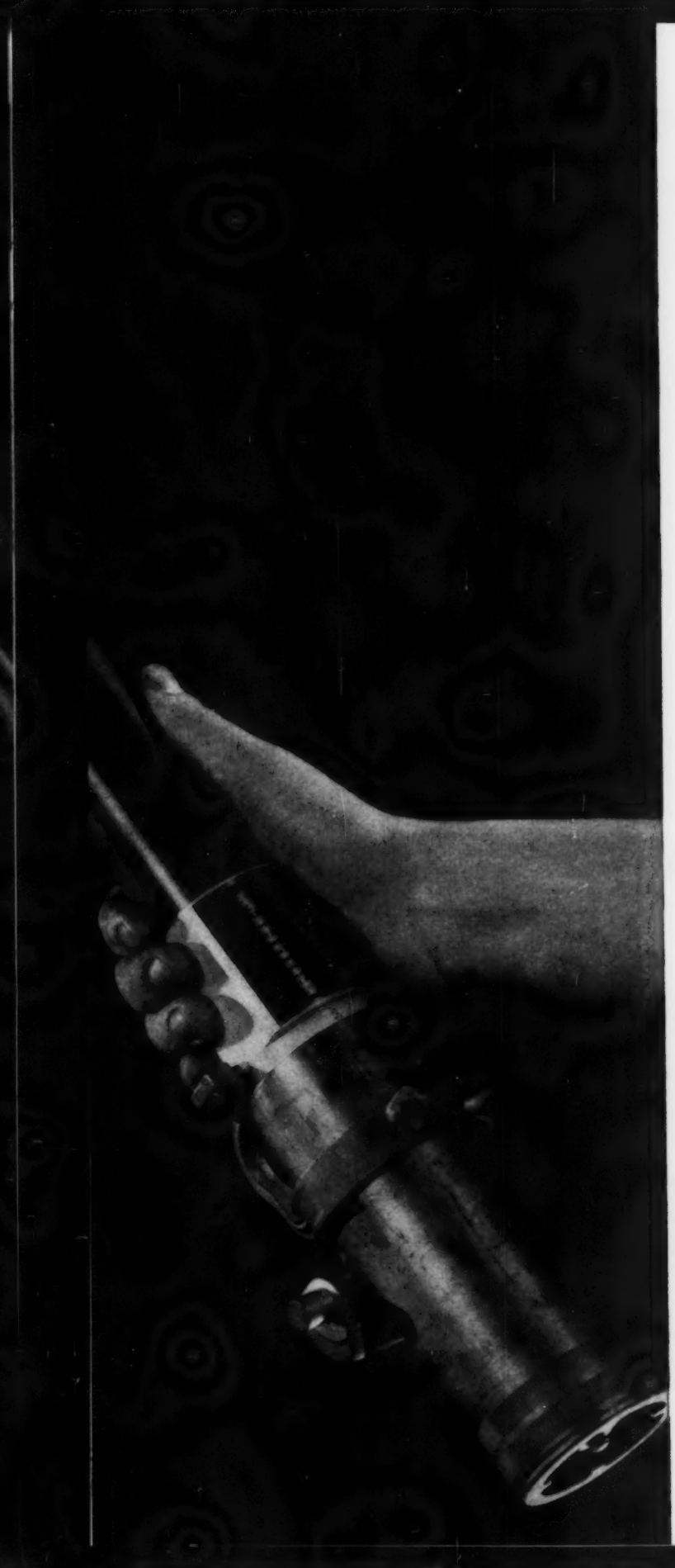


For phone number of closest representative see advertising index in back of book.

SEES ALL YOUR FAULTS



Inside view of typical bay, showing load interrupter (for switching), power fuses, and out-going pothead.



A Power Fuse both senses and clears short circuits— cuts cost of metalclad switchgear 50%

With S&C Metalclad Switchgear you get dependable protection for your high-voltage power circuits at about half the cost. How? Partly through the use of S&C Power Fuses instead of circuit breakers and relaying.

The power fuse is self-sufficient. It needs no instrument transformers, no relay. There is nothing to set, adjust, test, or maintain. You don't need special equipment or skills. After the fuse clears the fault and the cause has been corrected, you simply reach for a $13.50 refill stored in the compartment door.

Power fuses give you the protection you need against permanent destructive faults. Industrial and commercial high-voltage power circuits are not subject to transient faults (such as lightning, falling trees, wind, ice, rodents) and so don't need the automatic reclosing feature of the circuit breaker.

S&C fused interrupter gear meets the new National Electrical Code requirements for fault closing. It is available in short circuit interrupting ratings up to 500 mva at 14.4 kv, 250 mva at 4.16 kv. Continuous current ratings are 200, 400, and 720 amperes. Maximum capacity of main bus, 2000 amperes.

S & C ELECTRIC COMPANY

4425 Ravenswood Avenue • Chicago 40, Illinois

Specialists in High Voltage Circuit Interruption since 1911

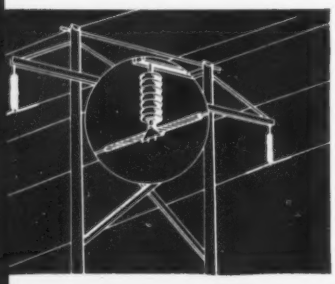
S&C

*Superformed** means better

ACCURACY · UNIFORMITY · GRIPPING

...*for* overhead line CONSTRUCTION, PROTECTION, REPAIRS

SUPERFORMING is an exclusive patented process for helical wire forming . . . *developed* by Fanner, the earliest commercial manufacturer of machine-formed armor rods . . . *formed* by special Fanner-designed machines with unequalled accuracy, freedom from surface damage or cross-sectional distortion . . . *tested* with specially-devised equipment simulating most severe operating conditions . . . *backed* by an organization which has built on Integrity, Service and Quality . . . *SAVES MONEY* because application is fast, simple, requires no tools . . . reduces maintenance . . . extends service life of conductors. That's why *more and more utilities are using more and more Superformed Products.* A-1429A

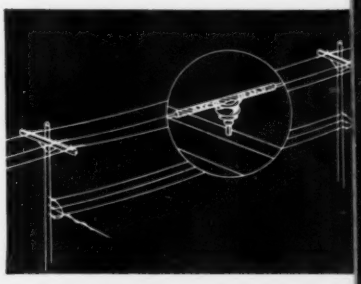


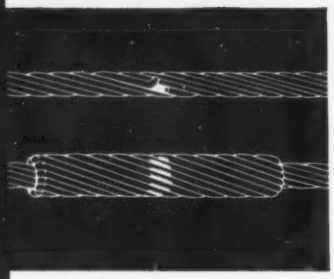
◀ ARMOR RODS

Protect against wind-induced and resonant-frequency conductor vibration at supporting points.

LINEGUARDS ▶

Protect at support points (and taps) in urban distribution where short spans are common; smaller wire sizes and shorter length than Armor Rods.



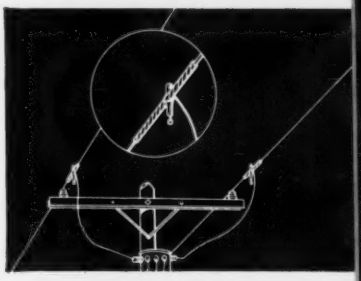


◀ PATCHRODS

Repair damaged or broken (up to 25% of strands) conductors, too far from support for Armor Rod to protect.

TAP ARMOR ▶

Protects where taps are required beyond extremities of Armor Rods on long spans or un-armored conductors.

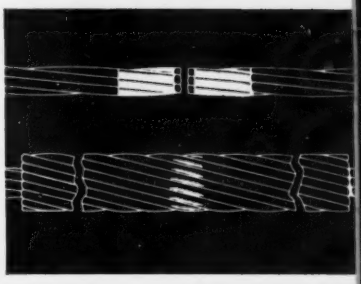


◀ FANNGRIPS

Provide ideal dead-ending and splices for wires, strands or cables for: Guys, Conductors, Multiplex Cables, Come Alongs, similar uses.

FANNSPLICES ▶

Join two ends of wire, or restore damaged conductors to original strength.



PLASTIC PRODUCTS FOR CONDUCTOR PROTECTION

Kover-Gard Ground Wire Moldings . . . Plastic Fannguards . . . Rigid and flexible Insulating Tubings.

For field or factory application, wherever there is a real need for surface covering.

STOCKS . . . SERVICE

Fanner Superforms are sold and serviced nationally by 22 Manufacturers' Agents in 34 locations. Stocked by electrical distributors from coast to coast.

PACKAGING

Superformed Products go to you in pre-packaged sets . . . the correct number of rods, centermarked with identification. Also supplied in bulk.

*Trademark

Fine Fanner Superformed Products

THE FANNER MANUFACTURING CO.
Brookside Park • Cleveland 9, Ohio

Electrical Products Division

Licensed for use under or made in accordance with one or more of the following patents: Patent No. 2,587,521, 2,769,478, 2,588,663—Other patents pending.

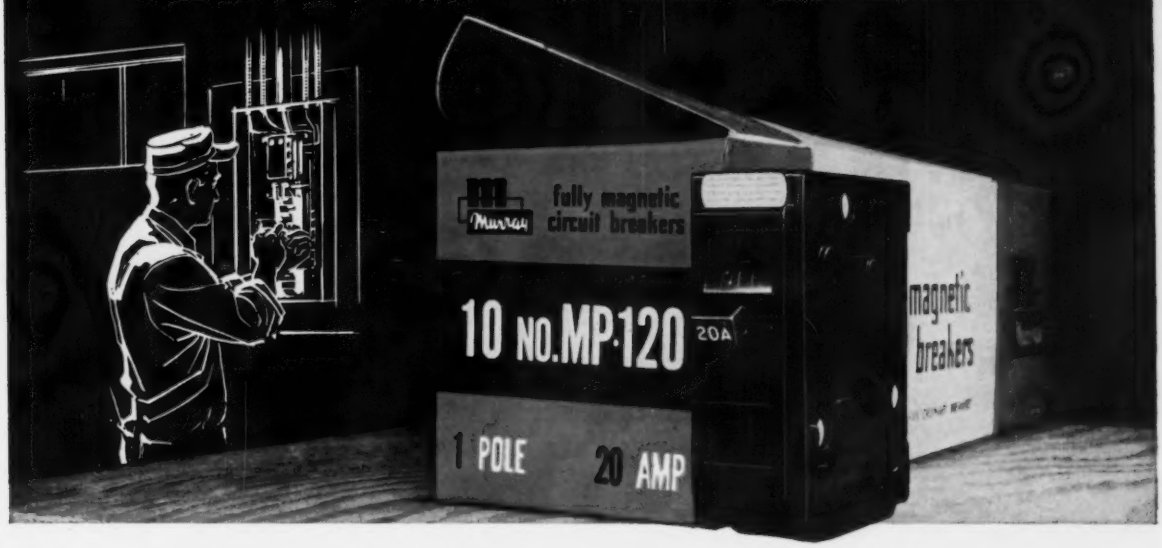
APPLICATION DATA

Specification and ordering are made easy by Fanner Superformed Products Catalog EP-8. Contains 48 pages of Selection, Application, Installation information.

fully magnetic, competitively priced . . . and now

GUARANTEED FOR LIFE

Murray "MP" Circuit Breakers



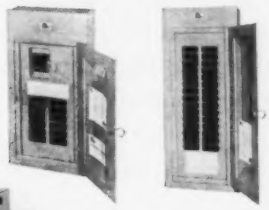
Build Business, Profits, Prestige!
Install the breaker that's best all around—best for you, best for your customers, and *Guaranteed For Life!*

You'll like working with "MP" breakers. *Fully magnetic* and unaffected by heat, these breakers never need derating, carry full rated load, never trip unnecessarily, can be installed anywhere it's most convenient for you or your customers.

Secondly, your customers will appreciate knowing that the breakers you install are *Guaranteed For Life.* It shows you're using the best, helps you get the business.

Extra Sales Aids For You!
You get a special Guarantee Certificate to leave with each customer plus a special sticker for your own promotion to use on each load center. This will boost your prestige, bring extra business your way.

Here's How You Can Cash In On This Guaranteed For Life Program!
See your Murray wholesaler today for full information on this precedent-breaking promotion. Ask him also about the material he has available to help you sell builders and homeowners on Murray *Guaranteed For Life* "MP" circuit breakers. Or write Murray directly for complete details.



60 YR YEAR Murray

Backed By A Full Line Of Load Centers

Murray Manufacturing Corp., 1250 Atlantic Avenue, Brooklyn 16, N.Y.
Dept. G-6

Gentlemen:

A circuit breaker that's *Guaranteed For Life!* I'm interested. As soon as possible, send me complete information on everything.

Name_____

Address_____

My wholesaler is_____

For phone number of closest representative see advertising index in back of book.

Blackburn's

New Testing Facilities

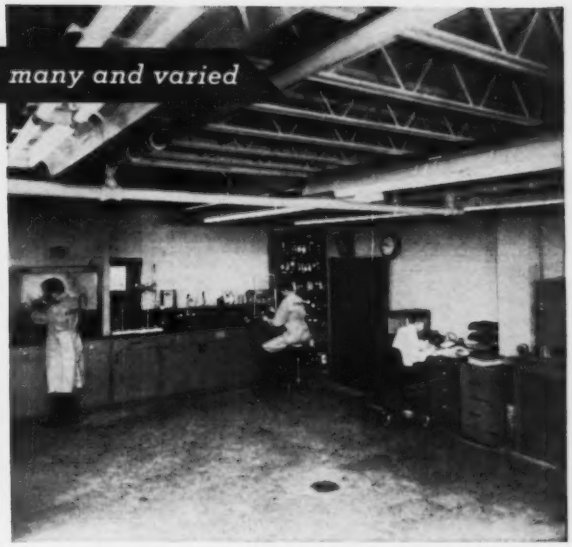
give accurate test data for utilities, precise evaluation of design ideas

PART OF THE CONTROL PANEL of Blackburn's recently completed current cycling laboratory. John A. Toedtman, Chief Engineer (left), and Ken Way, Vice President, observe tests in progress.

NEW CURRENT CYCLING LABORATORY features virtually draftless air conditioning and a means of closely controlling ambient temperatures throughout the test area. Control of these factors permits truly precision testing of connectors. This photo shows Blackburn laboratory technicians taking resistance and temperature measurements of test connections. These new facilities permit testing of more than 500 connectors simultaneously. Advanced testing facilities like these enable Blackburn to provide you with the proper fitting for every operating condition.

. . . and the tests are many and varied

THE GENERAL LABORATORY, a portion of which is shown here, is the scene of a great variety of tests. Hardness, yield and breaking strength of parts such as castings, bolts, etc., are determined. Special equipment is available for pull-out or holding force evaluation of all fittings. Clamping force measurements giving the relationship between tightening torque and the force exerted by the connector on the conductor are made here. Microscopic examinations and special electrical resistance measurements are routine. Tests like these give Blackburn fittings great dependability.



THE CHEMICAL LABORATORY is the center for tests to control various chemical process solutions used in production. Electroplating, etching, and metal cleaning solutions are regularly tested here. In addition, special surface treatments are evaluated for friction control and corrosion protection. Thus, this laboratory assures continuous control of quality.

SALT FOG CHAMBER, where tests may continue for hundreds or even thousands of hours. Here salt fog tests are made on wire connections. Test conditions are made in accordance with ASTM specifications. Electrical resistance measurements and visual observations are recorded at regular intervals during the tests.

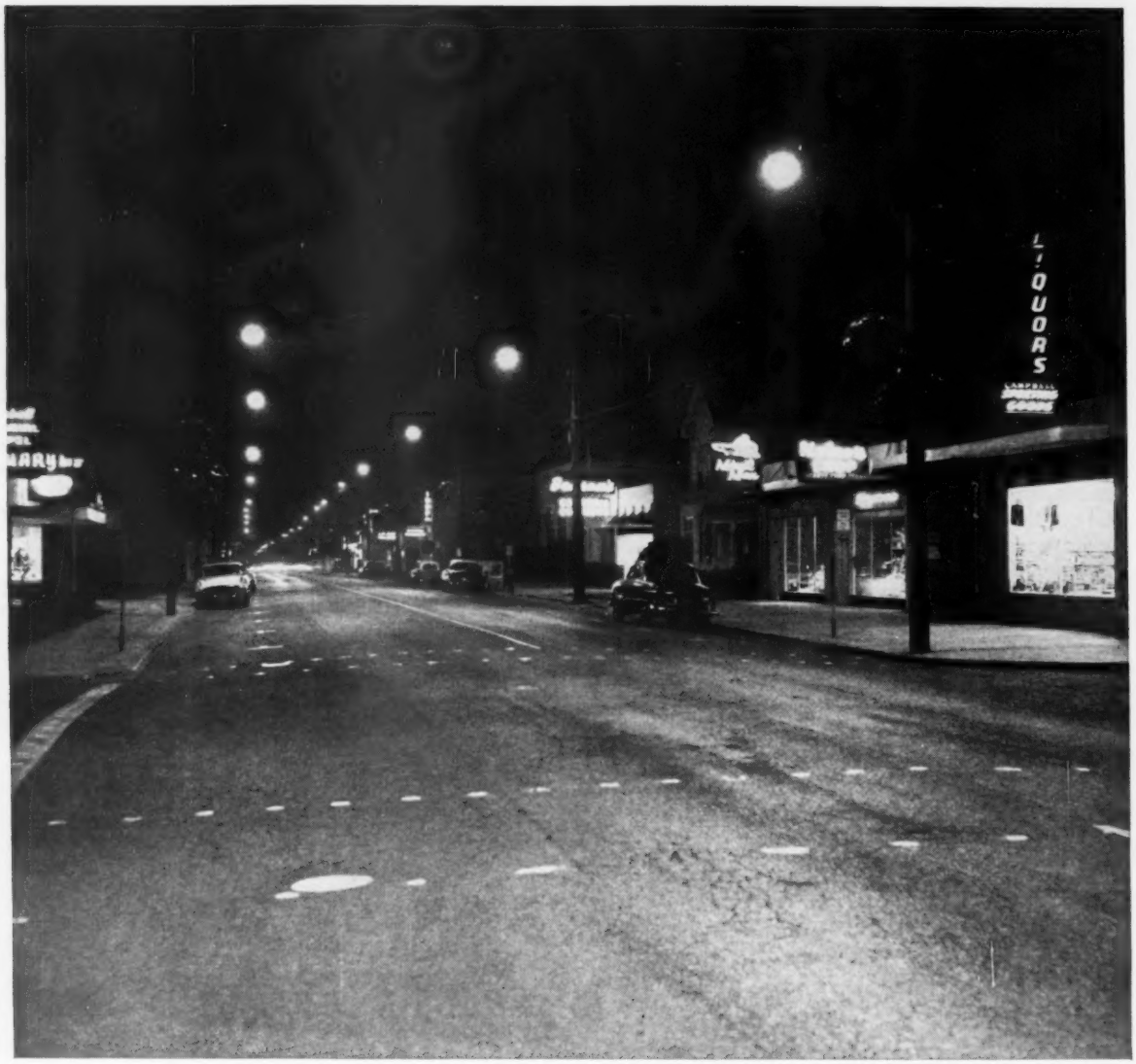
OUTDOOR EXPOSURE RACKS permit long-term exposure tests which often yield valuable information on weathering resistance not accurately obtainable from more highly accelerated tests. Specimens on these racks generally remain on test for at least a ten-year period.

Look to BLACKBURN for *test-engineered* electrical fittings

JASPER BLACKBURN CORPORATION

1525 Woodson Rd. • St. Louis 14, Mo. • WYdown 3-9430

For phone number of closest representative see advertising index in back of book.



when Campbell's new street lights went up . . . SO DID BUSINESS!

It's wonderful the change that comes over a town when its streets are made bright, safe and friendly. Merchants notice its first effects in *nighttime shopping*...people feel more comfortable about stepping out after dark. Civic pride is bolstered . . . even real estate values have a way of rising in the light of "good municipal housekeeping."

Campbell's street lights introduced two important advances: Individualized automatic operation (photoelectric cells turn *each light* on as required at dusk; off at dawn), and a new color corrected mercury vapor light that provides much more natural illumination.

Want to bring safe, friendly streets to your town? Ask the local P. G. and E. office for the free booklet, "Modern Street Lighting for YOUR Community."

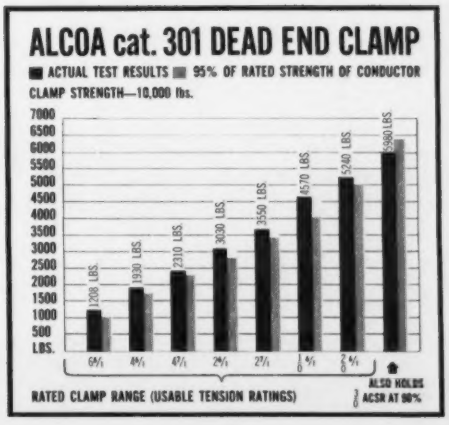
P·G and E·

Pacific Gas and Electric Company

Very new dead-end clamp

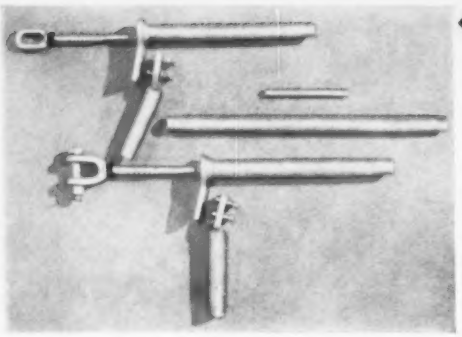
We say "very" new to emphasize the importance (to you) of this clamp. It's designated 301 in our catalog. But that doesn't begin to tell you of its many advantages. Possibly the first thing you will notice is the ½-inch aluminum U bolt. That's right—½-inch high-strength aluminum alloy with Alumilite 205 finish and grease film. And the clamp itself? It's compact, cast in one piece of a high-quality aluminum alloy noted for its corrosion resistance. The large pulling eye is an integral part of the structure of the clamp. Makes it easy to use the hoist hook. What about holding power? This full-tension clamp will hold 95% of the rated strength of the conductors for sizes No. 6 to 2/0 ACSR. The bar chart appearing below gives you the full story.

You'll appreciate, too, how easy this new Cat. 301 dead-end clamp is to thread. No kinking or twisting, because that long bolt gives you plenty of freedom. We've also paid attention to details—Alclad washers, the sheared clevis pin for hot stick use, aluminum cotter pin, and such. The biggest news of all may well be price. We'd be happy to discuss it (and all the reasons why the Cat. 301 is such a value) with you.



The question of clamp ratings

How do you rate a clamp? If the figure you've been accustomed to receiving represents the rating of the clamp itself before it breaks, have another go at it. What really counts, as you well know, is the holding power on the conductor—not the tension required to pull the clamp apart. Consequently, we always refer to how the clamp holds the conductor as the usable tension rating. So we provide you with the usable ratings for Alcoa clamps. Makes sense, doesn't it?

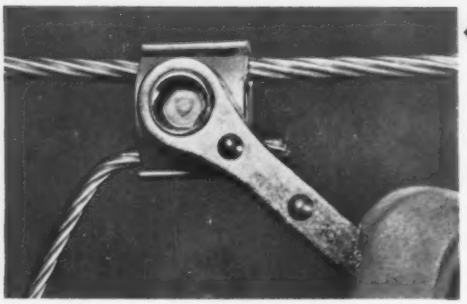


What to look for in tubular line accessories

Take a look at the picture. These tubular accessories you will find easy to handle and install. Spacing of bolt holes of dead-end tongues is standardized so you can fit any terminals to any dead-end body. Where desired, the tongue can be positioned radially about the axis of the conductor before compression. Note, too, that the 15° angles on dead-end tongues and terminals means you can place the jumper loop in either perpendicular or 30° position with the same accessories. Every item is marked with catalog identification, dies required, and position for compression. Conductor goes in easily. Available for use with standard conductors up to 1,590,000 CM, as well as many of the "special" and large-diameter conductors for extra-high-voltage applications.

No more kinking

Why didn't someone think of this before? Deceptively simple in appearance, this wheel-like device holds small parallel-groove clamps, so you can apply torque to the bolt without kinking the wire. In fact, the holder wheel holds two clamps—the Cat. 490.0 for #6-#2 AWG on one side, and the Cat. 396.6 for #6-2/0 ACSR on the other. The grooves on the periphery of the wheel give you a good grip when wearing gloves. What it adds up to is no kinking—a big difference in the appearance of your service lines. Made from aluminum (of course!), the wheel is priced at just $1.00. How many can you use?



How tight is right?

Nobody will argue that bolts must be tight. But how tight? Because they are greased and have smooth surfaces, Alcoa aluminum bolts for accessories develop high tensions at relatively low twisting forces. So, putting the right pressure on—without using an expensive torque wrench—requires skill. How to do it easily by measuring rotation of the bolt in small pg clamps is spelled out in an illustrated bulletin. Send for a copy.

ROME CABLE DIVISION OF ALCOA
Rome, New York

Please send me the items checked below:

- ☐ Data on Cat. 301 dead-end clamp
- ☐ Tubular compression accessories catalog
- ☐ Information on ordering the new Alcoa holder wheel
- ☐ "How tight is right" bulletin

Name .....

Title .....

Company .....

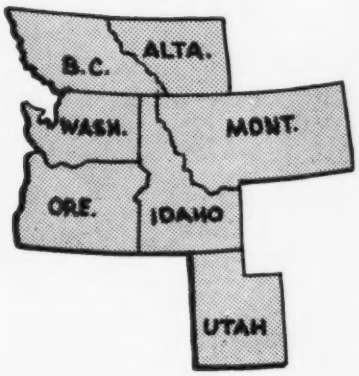
Address .....

ROME CABLE
DIVISION OF **ALCOA**

NELPA

SERVING THE ELECTRICAL INDUSTRY FOR OVER 50 YEARS

OFFERS THE OPPORTUNITY TO THINK—PLAN—WORK TOGETHER



Electric Utility Companies, Electrical Manufacturers, Distributors, Contractors, Retailers and Service Companies join membership in NELPA to carry on activities which in part consist of:

* Workshop Conferences
  1. Engineering & Operation
  2. Business Development
  3. Personnel & Safety
  4. Accounting
* Serving As A Voice For Tax Paying Electric Utility Companies That Serve Over 2,850,000 Customers In The Northwest.
* Conducting Industry Surveys.
* Clearing House For Information.
* Promoting The Progress Of The Electrical Industry So That The Public May Be Better Served. (Object Of NELPA)

The Investor Owned Utility Members of the Association provided an additional 3,000 construction jobs during 1959 as $250,000,000 of private money was being spent.

745,000 kw of electric energy was dumped into the Northwest Power Pool during 1959 by NELPA's utility members.

Associations Accomplish Those Things Which Most People Think Just Happen

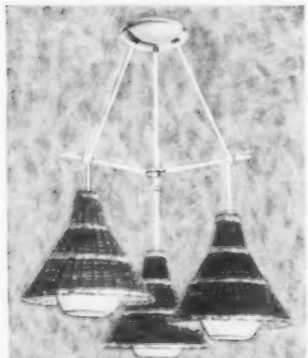
NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

204 CORBETT BUILDING • PORTLAND, OREGON

the light idea®

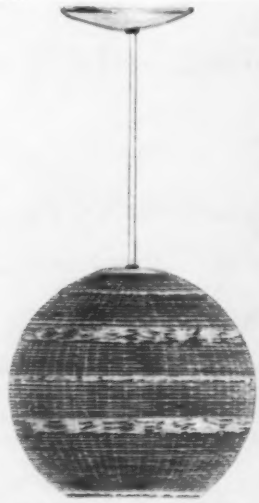
SUN 'N SAND Unique, different . . . appealing! Shades are an arresting blend of imported Italian sand-tone reed, handwoven with glistening brass accents. Satin white, vacuum formed styrene diffuser. Sun 'N Sand — original . . . beautiful . . . modern!

V-5675 For hallways or tasteful accent lighting. Length 8¼", diameter 6½". One 100-W.

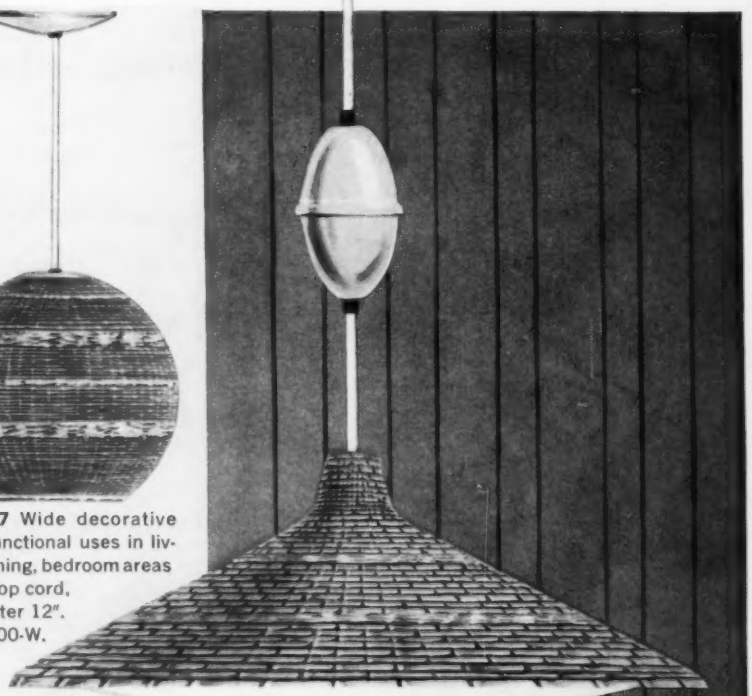


V-1676 Designed for dramatic living room lighting. Three-light cluster. 48" white drop cords. Diameter 26½". Three 100-W.

V-1675 Single unit 48" drop cord. Diameter 10½". One 100-W.



V-1677 Wide decorative and functional uses in living, dining, bedroom areas 60" drop cord, Diameter 12". One 100-W.

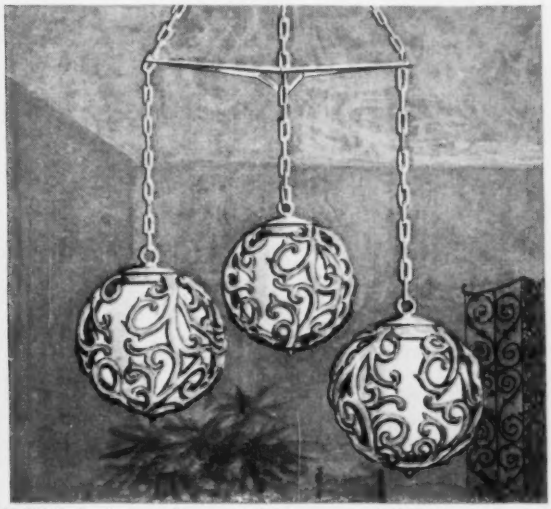


V-1673 Pulldown for living or dining rooms. Adjusts 20" to 56". Diameter 22". Three 60-W.

V-1672 Same but 17" diameter. Two 60-W.

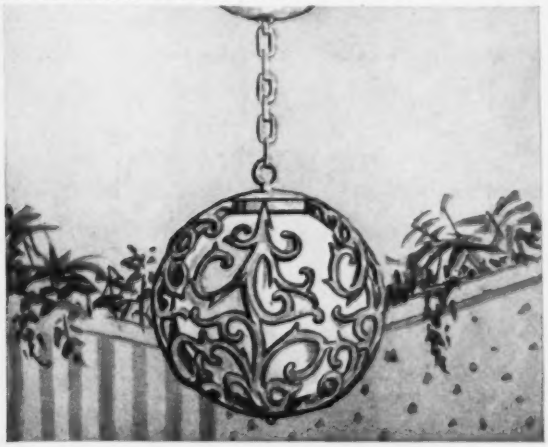
new custom creations

FLORENTINE SERIES Exquisitely detailed scrolls cast in aluminum. Antique white color delicately toned with gold fleck. White opal globes. Matching white chain. Here is new richness for all homes — contemporary, transitional, traditional!



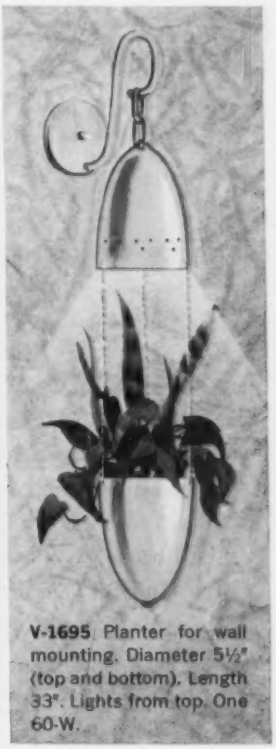
V-1713 Perfect in foyers, living rooms, dining areas. Spread 31" (6' chains and yolk). Three 100-W.

V-1712 Majestic! Diameter 12". Matching white 6' drop chain. V-1710 diameter 10". One 150-W.



PLANTER SERIES Bright ideas! Lighting fixtures that double as planters. Perfect accents for fireplace, entranceways, in dinettes or family rooms . . . wherever you want a touch of eye-catching beauty!

V-1690 Polished brass. Diameter 15⅜". Length 36". Lights from top. Three 60-W.



V-1695 Planter for wall mounting. Diameter 5½" (top and bottom). Length 33". Lights from top. One 60-W.

These are just a few of the fresh, new custom creations available...fixtures so delightfully different and irresistibly styled..."to show is to sell." Free colored brochure describing the full line available. See your nearest Virden Lighting distributor or write direct using the coupon below.

VIRDEN LIGHTING

MEMBER AMERICAN HOME LIGHTING INSTITUTE

VIRDEN LIGHTING DEPT. ELW-6
DIVISION OF JOHN C. VIRDEN COMPANY
5209 EUCLID AVENUE
CLEVELAND 3, OHIO

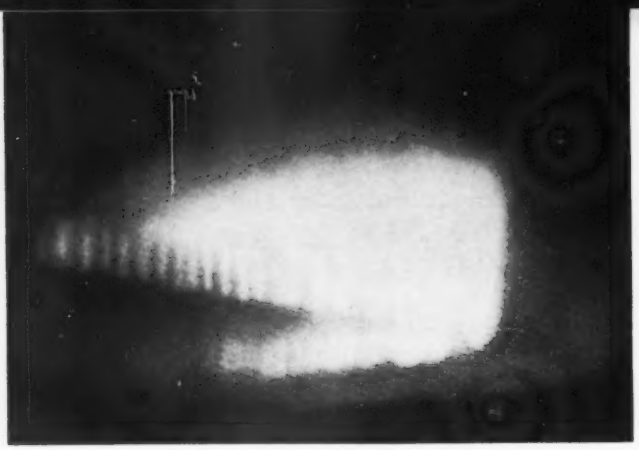
Name_____

Address_____

City_____ Zone____ State____

SUBSIDIARIES: LIGHTING DYNAMICS, INC., LOS ANGELES, CALIF. AND DALLAS, TEXAS; JOHN C. VIRDEN, LTD., TORONTO, ONTARIO.

For phone number of closest representative see advertising index in back of book.



Corona effect—beautiful to look at

The Aurora Borealis is a spectacular sight to see but it knocks out communication systems all over the world. In high voltage power cables, corona effect or ionization creates ozone which causes rapid deterioration of ordinary rubber insulation.

Years ago, engineers at American Steel & Wire took steps to correct this situation. They developed PS shielding with semi-conducting rubber tape wrapped around the conductor and over the insulation. This eliminated air gaps which might cause spark discharge and provided the best possible contact between conductor and insulation. Semi-conducting rubber shielding has since been adopted by the industry.

Another development, butyl rubber insulation, combines outstanding resistance to the effects of ozone, with heat stability and high moisture resistance.

In USS Tiger Brand Cables, this insulation is known as Amerzone B. It will withstand current loadings resulting in copper temperatures of 90°C.

The combination of PS shielding and Amerzone B insulation in Tiger Brand Cables (5 to 15 KV), plus an Amerprene 90 cover, provides a power cable with outstanding reliability and performance.

Such cables can be used for installation in ducts or for direct burial in earth, for aerial use, and many other high voltage applications. For more information, write for our booklet, "Tiger Brand Power Cables," which covers Amersheath Type RR Cable and Metallic Parkway Cables. Address American Steel & Wire, Dept.0223, 614 Superior Avenue, N. W., Cleveland 13, Ohio.

USS, Tiger Brand, Amerzone and Amersheath are registered trademarks

USS Tiger Brand Electrical Wire & Cable—A standard cable for every special job

Asbestos Wire and Cable • Varnished Cambric Cable • Mold-Cured Portable Cord • Interlocked Armor Cable • Shovel & Dredge Cable • Special Purpose Wire & Cable • Paper & Lead Cable • Aerial, Underground and Submarine Cable

American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

. but dangerous in cables

Corona eliminated
Test showing two conductors both insulated with "ozone-proof" rubber, but the one on the left is not shielded and shows corona. On the second conductor, Type PS shielding prevents corona formation.

Plenty of Committees Energetically Acting

Engineering and Operating, Business Development, Administrative Services—these sections of PCEA each have many committees and subcommittees working regularly throughout the year.

These are the major "Action" groups of PCEA—each committee has energetic electrical industry people tackling problems NOW! Working today to make everyone's opportunities tomorrow better—larger and more profitable loads for utilities . . . bigger markets for electrical manufacturers and wholesalers . . . more projects for contractors and engineers . . . more customers for all.

PCEA has always been a working organization. Its strength is in the enthusiasm and energy and action of its individual members. Thanks to them and their day-in and day-out efforts, this Association "gets things done that people think just happen."

PACIFIC COAST ELECTRICAL ASSOCIATION

530 West Sixth Street
Los Angeles 14

681 Market Street
San Francisco 5

Still in one piece

Frames from a high speed motion picture showing, successively: venting of gas through the Thorex pressure-relief system at the instant of fault current initiation, clearing of smoke and dust cloud, and the intact housing (far-right) after the test was completed.

Thorex arrester on pressure-relief test survives massive fault current...intact!

Output of several 230-kv transmission lines was added to 75 per cent of the total capacity of one of the country's largest hydro plants to produce the massive fault current used in this test of Thorex arrester internal pressure relief.

Station Class Thorex Type MPR arresters, with internal parts damaged to assure failure, were subjected to a symmetrical rms current of 23,000 amperes which, with offset, gave a 43,500-ampere crest. These arrester housings survived this fault current with all parts completely intact.

Factors contributing to this are (A) Pressure-relief diaphragms, at both ends, larger than the internal diameter of the arrester housing. (B) Direct-acting relief provisions, sensitive to *pressure only*, and functioning in an instantaneous single step. (C) A clear internal path of generous size, not impeded by any circuit parts, passes the rapidly traveling pressure front to the relief diaphragms.

There may come a time when an arrester is expected to fail. When that happens, its ability to remain physically intact can save costly damage to surrounding equipment. Thorex Dynagap Type MPR Station Class arresters have generous safety provisions for such an emergency, demonstrated by severe field testing.

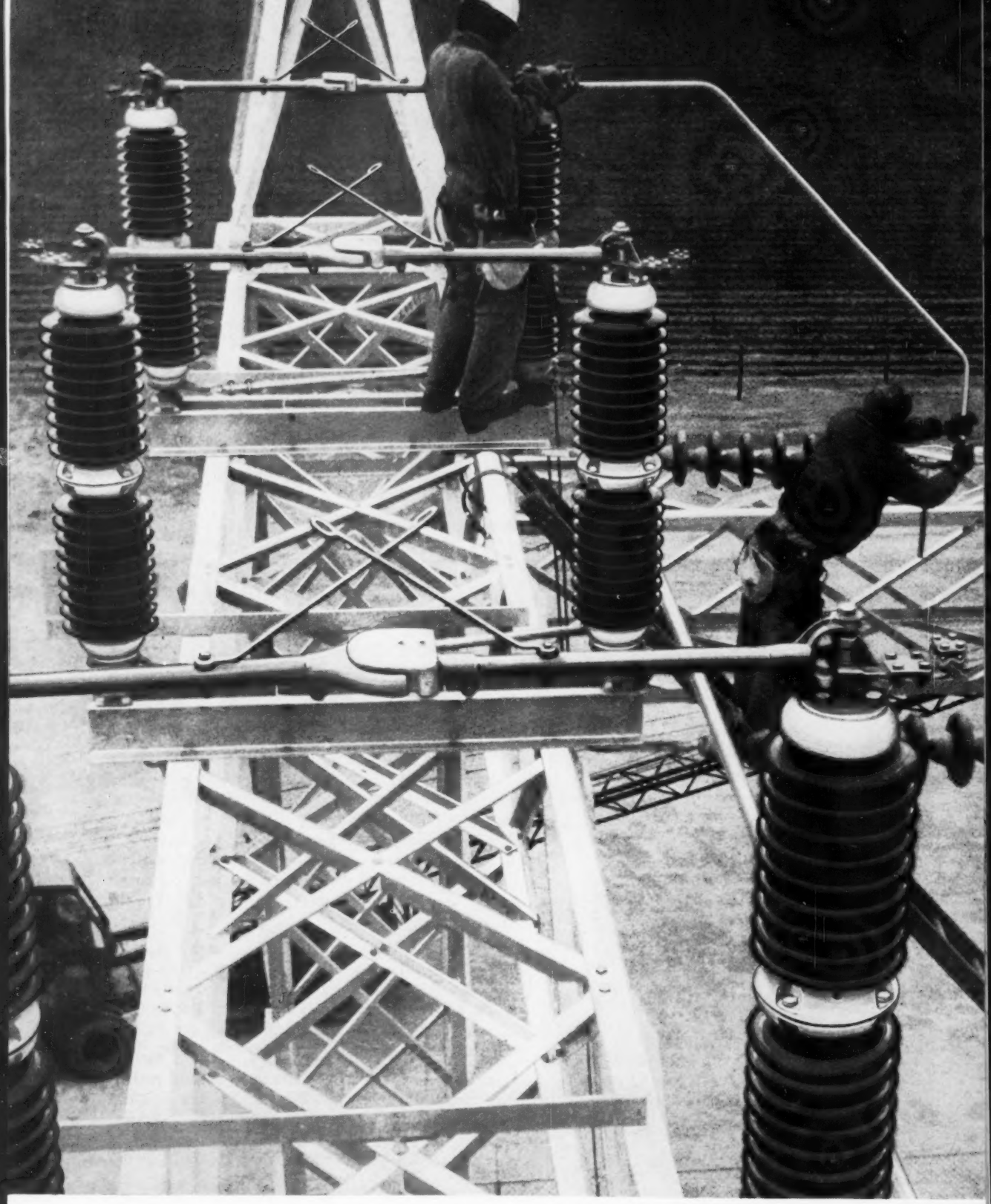
Here is just one more of the many proven reasons why you should specify Thorex Dynagap lightning arresters on your next station construction.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

10001-H4



Southern States 115 kv, 600 ampere Type GG switches being installed. The GG is available in voltage ratings from 34.5 kv – 161 kv and continuous current ratings of 600 and 1200 amperes.

KEEP PACE ELECTRICALLY

CURRENT FOLLOWS LOW RESISTANCE PATH THROUGH SOUTHERN STATES' BRAIDLESS AIR SWITCHES

Southern States has solved the big problem of providing efficient current transfer in high pressure, braidless side-break air switches. A unique design overcomes any question of reliability in the two current-carrying swivel assemblies inherent in this type of switch.

As a result, in the new Southern States Type 57L and Type GG you can now be assured of low resistance through each swivel assembly, adequate capacity for short circuit currents, and freedom from corrosion and contamination.

This is accomplished by the four-piece swivel units* consisting of carefully machined terminal and blade castings, hinge pin, and pressure clamp —securely bolted together so that the pressure clamp and terminal casting fit into deep, matching grooves on the hinge pin. The silver-plated grooves provide a natural barrier to foreign matter, act as a stable bearing surface for the terminal, and furnish a liberal contact area. The assembly is permanently sealed with a non-aging lubricant.

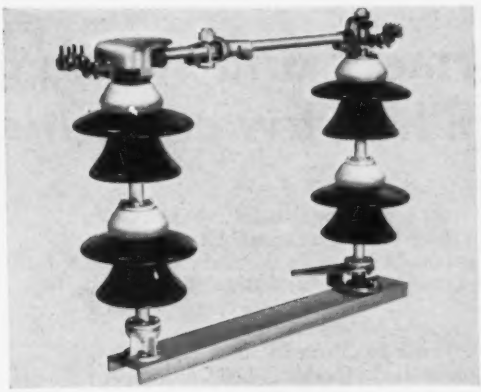
The hinge pin and terminal casting are kept under high pressure by a stainless steel coil spring (insulated by a nylon spacer) to establish the most efficient current interchange point.

The entire assembly, although under high pressure, rotates smoothly—without binding or wedging. It operates satisfactorily under short circuit conditions and well within the limits defined by NEMA for continuous current performance.

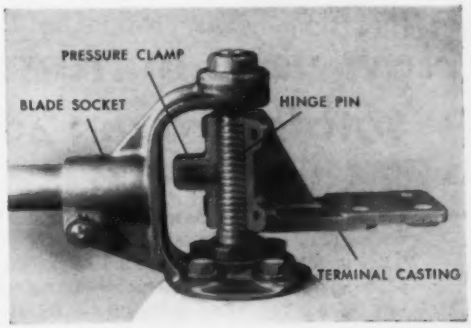
AMPLITACT® contacts are added assurance of contact performance under extremely high fault currents.

For complete details on these new braidless switches, contact your Southern States representative or write directly to us.

*Toggle point of 57L switch blade uses modified version of this assembly.



Type 57L braidless side break available in voltage ratings from 7.2 kv - 161 kv and continuous ratings of 600 and 1200 amperes.



SWIVEL ASSEMBLY—CUTAWAY VIEW

The GG uses the swivel assembly shown as the pivot on both rotating insulators. The 57L uses an identical assembly on its rotating insulator and the same construction principle at the toggle point of the 57L blade.

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA—Dominion Cutout Co., Ltd., Toronto

Now used in transformers and switch gear totaling over 25 million kw capacity

Shell Diala Oil AX has an enviable preference record in the electric power industry. This is due to its exceptional oxidation stability, plus high dielectric strength and low pour point. It all adds up to the utmost in reliability, equipment protection and long life.

Shell Diala Oil AX is inhibited to prevent oxidation . . . it has established new high standards throughout the industry. Actual tests show that Diala® Oil has two to three times greater stability than conventional oils.

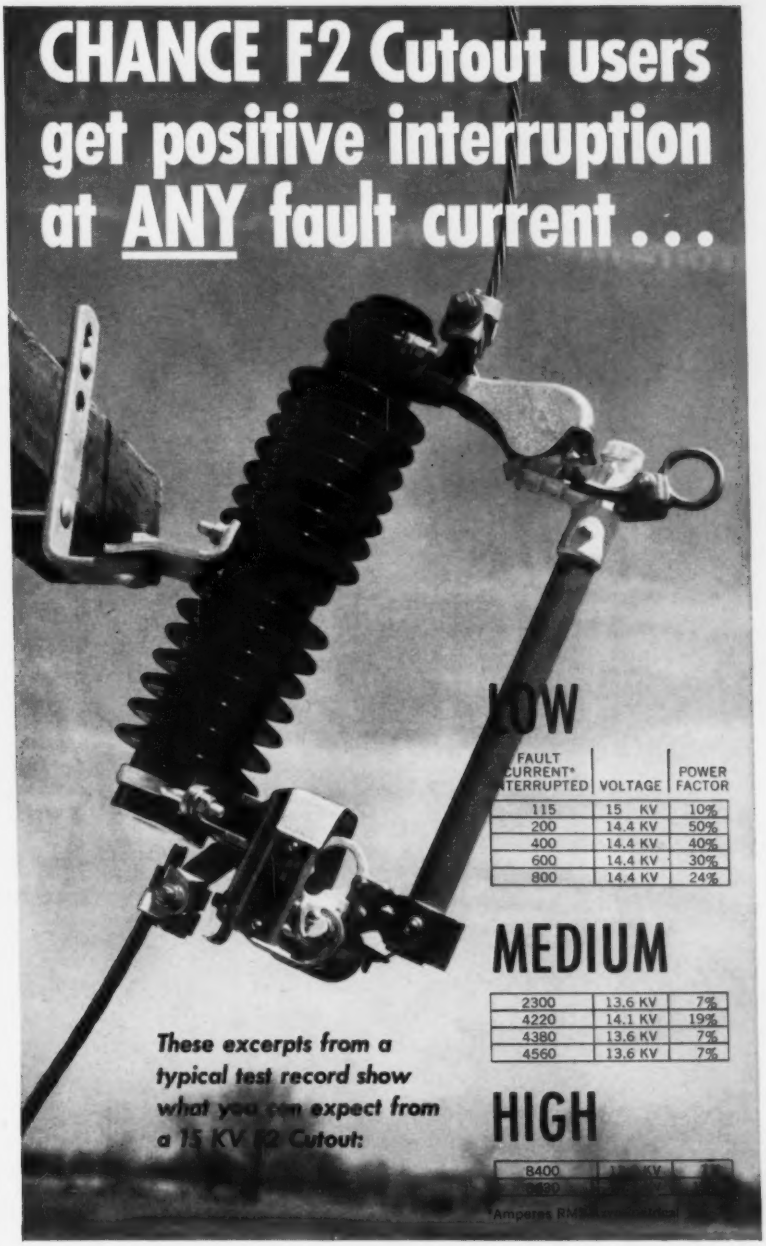
Let a Shell Representative tell you about Shell Diala Oil AX. Write or call: Shell Oil Company, 50 West 50th St., New York 20, N. Y., or 100 Bush St., San Francisco 6, California. In Canada: Shell Oil Company of Canada, Limited, 505 University Ave., Toronto 2, Ontario.

SHELL DIALA OIL AX

the inhibited insulating oil

SHELL

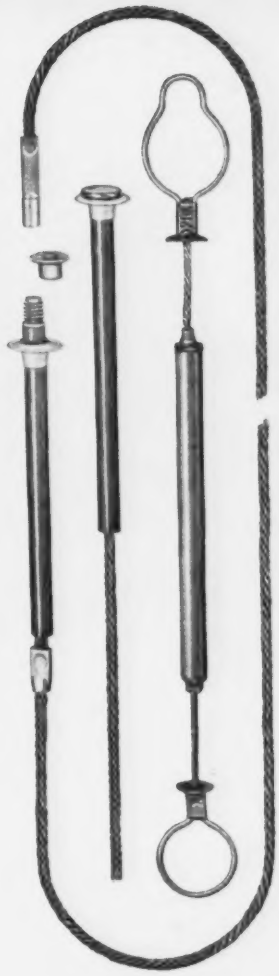
CHANCE F2 Cutout users get positive interruption at ANY fault current . . .


LOW
FAULT CURRENT* INTERRUPTED | VOLTAGE | POWER FACTOR
115 | 15 KV | 10%
200 | 14.4 KV | 50%
400 | 14.4 KV | 40%
600 | 14.4 KV | 30%
800 | 14.4 KV | 24%
MEDIUM
2300 | 13.6 KV | 7%
4220 | 14.1 KV | 19%
4380 | 13.6 KV | 7%
4560 | 13.6 KV | 7%
HIGH
8400
These excerpts from a typical test record show what you can expect from a 15 KV F2 Cutout:

Utilities from coast-to-coast, impressed with the ruggedness and full range effectiveness of the Chance F2 Cutout, have written it into their standards. These utilities are sold on the F2's ability to protect their systems from *any* fault—HIGH, MEDIUM, or LOW (and points between) without damaging shock to procelain or fuse tubes. The F2 expandable cap and link ejector make this possible.

Chance F2 Cutouts, in voltages of 5.2, 7.8, 15 and 27 KV, and in 100 and 200 ampere ratings with interrupting capacities up to 12,000 amps, are available from local stocks. *They are also available in combination with lightning arrestors.*

A. B. CHANCE COMPANY, Centralia, Mo.
A. B. Chance Company of Canada, Ltd., Toronto CK60-24



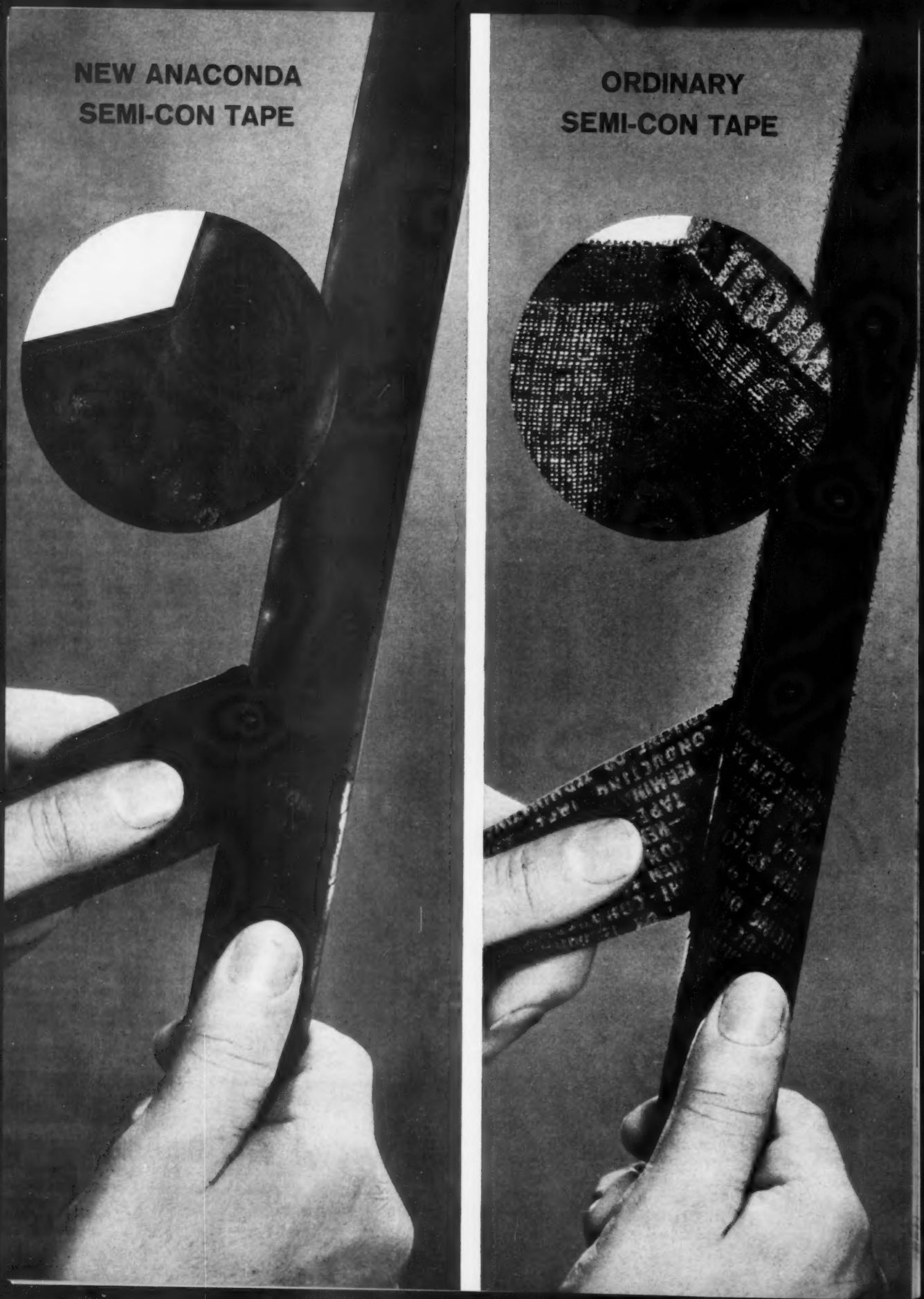
. . . and Chance Fuse Links perform dependably at all values of fault currents

Precision-made to EEI-NEMA Interchangeability Standards, Chance K (fast) or T (slow) links are available from 1 to 200 amps with Universal Buttonheads, or as Universals with removable buttonheads and cable adapters, and from 1 to 50 amps in Open-Link style. They have extra-high strength, two-ply protecting tubes with an arc-quenching inner layer and a weatherproof outer layer. Cables are lead-coated for maximum resistance to corrosion.

The fusible elements of these fast or slow fuse links have the consistent melting characteristics needed to give dependable performance in any distribution cutout at all values of fault currents.

Chance Fuse Links are packaged in 5-unit, easily separated containers. Perforated ends on each container allow easy removal of link, even with gloved hands. Type and rating are clearly marked on both ends of each box.

Write for "Fuse Links and How To Use Them," a free manual on fuse link application and coordination.


NEW ANACONDA
SEMI-CON TAPE
ORDINARY
SEMI-CON TAPE

NOW YOU CAN GET SAFER, FASTER, MORE RELIABLE JOINTS AND TERMINATIONS ON HIGH-VOLTAGE CABLE

Anaconda Durasheath has a new clean-stripping, semi-conducting tape

PROBLEM: To make a sound, safe, high-voltage splice, every last speck of semi-conducting tape material must be removed from the insulation . . . if traces remain, chances are the joint will eventually fail. But—this important step requires tedious scraping and buffing.

SOLUTION: The new Anaconda-developed *clean*-stripping, semi-con tape, which is an exclusive feature of Durasheath Cable. The photos (left) were taken immediately after semi-con tapes were stripped off the insulation. It takes much longer to get other cable insulation surfaces as clean. That's why this exclusive feature makes splicing a great deal easier.

The planned research and production program which brings you this outstanding cable development is also responsible for the equally important developments in Butyl rubber insulation compounding and extruding—which have produced the best possible balanced design and construction in high-voltage rubber-insulated cable obtainable today—Anaconda Durasheath.

For additional, more technical information about Anaconda Durasheath, write for Anaconda Bulletins, DM-5903, covering Durasheath High-Voltage Cable, and DM's-5566, -5720 and -5735, dealing with the splicing and terminating of Durasheath Cable. Contact your nearest Anaconda Wire & Cable Company district office, or write to 25 Broadway, New York 4, N. Y.

60239

ASK THE MAN FROM

ANACONDA®

FOR DURASHEATH® CABLE

FASTEST WESTERN SERVICE—At Orange, California, Anaconda's expanded, modernized mill fabricates and stocks copper and aluminum wire and cable for every type of application. Anaconda assures the fastest possible service on all West Coast needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle, Denver.

C2030-PRF

NEW combination meter & service entrance devices FROM SQUARE D...

A choice of 28 devices from which to select the combination meter and service entrance device most suited to your installation!

NOW

- 150 and 200 ampere ratings with main fusible pull-outs.
- 200 ampere ratings with six sub-divisions of load.
- Tandem QO breakers—more circuits in the same space.
- Adapted for 1959 N.E.C. non-interchangeable circuit breaker regulations.

C1620-QRF

With New Wide (13¾") NEMA 3 Enclosures

- More wiring room.
- Top load knockouts in semi-flush devices.
- Mount between and to the studs—no framing.

NEW QO TANDEM

Combines two full size breakers into one space-saving unit

Cat. No.	Cat. No.
QO1515	QO2020

All devices underwriters laboratories approved.

NEW SPECIFICATIONS & CATALOG NUMBERS

Main Type	Main Rating	Maximum Usable Single Poles: Single	Maximum Usable Single Poles: Tandem	Surface Raintight Cat. No.	Semi-Flush Raintight Cat. No.	New Designs Replace Cat. No.	New Designs Replace Cat. No.
Cir. Brkr.	50	6	10	C610-QRO	C610-QRF	QO44MRO-50	QO44MRF-50
Cir. Brkr.	70	10	14	C1014-QRO	C1014-QRF	QO44MRO-70	QO44MRF-70
Cir. Brkr	100	12	20	C1220-QRO	C1220-QRF	QO45MRO-100	QO45MRF-100
Cir. Brkr.	100	16	20	C1620-QRO	C1620-QRF	QO56MRO-100	QO56MRF-100
Pull-Out	150	20	30	C2030-PRO	C2030-PRF	—	—
Pull-Out	200	24	40	C2440-PRO	C2440-PRF	—	—
Lugs Only	100	8	12	C812-RO	C812-RF	QO44RO	QO44RF
Lugs Only	200	12	12	C1212-RO	C1212-RF	—	—
Cir. Brkr.	70	0	0	C70-QRO	C70-QRF	RO-383270	RF-383270
Cir. Brkr.	100	0	0	C100-QRO	C100-QRF	RO-383216	RF-383216
Pull-Out	200	0	0	C200-PRO	C200-PRF	RO-383004	RF-383004
		Double	Single				
Split Bus	100	1	8 14	C2X-814RO	C2X-814RF	QO44-208RO	QO44-208RF
Split Bus	100	3	8 14	C4X-814RO	C4X-814RF	—	—
Split Bus	100	5	8 10	C6X-810RO	C6X-810RF	—	—

Write for complete details to: Square D Company, 4335 Valley Blvd., Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

"WHEREVER ELECTRICITY IS DISTRIBUTED AND CONTROLLED"

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

Recent Economic Growth — The Numbers Game

If it truly portrayed recent rates of economic growth in the United States, the report on employment, growth and price levels recently issued by the staff of the Joint (Congressional) Economic Committee would point up scarcely less than a national disaster. Among other things, it would document impressively Premier Khrushchev's crack that "the capitalist steed the United States is riding . . . is worn out."

One of the major findings of the Joint Committee's staff (in the Eckstein Report, named for its staff director Otto Eckstein) is that between 1953 and 1959 the average rate of growth of physical output in the United States was only 2.4 per cent per year. This is scarcely more than half the average annual rate of growth of 4.6 per cent the staff found to have prevailed between 1947 and 1953.

Happily, however, the report does not reflect the basic economic realities. Its finding on relative rates of economic growth for the two periods is a statistical *tour de force* which, by the selection of certain figures and certain dates, distorts the record of America's long-term economic growth.

Playing The Numbers Game

By the selection of appropriate starting and terminal periods it is possible to document almost any rate of economic growth that is desired. The table at the bottom of this page shows you how this can be done. It will also show you how the Eckstein staff worked out its shocking contrast in growth rates. The table is built like a schedule of airplane fares between different cities. The postwar years 1946 through 1959 are put down on two axes. One runs down the left hand column, the other runs across the top of the table. Put your finger on the point where the two axes intersect and you have the average rate of growth for the period covered.

ANNUAL AVERAGE GROWTH RATES OF THE U.S. ECONOMY, 1946-1959*

(Percent increases, starting year to terminal year, of GNP in 1954 dollars).

Starting Year \ Terminal Year	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
1946	X	–0.1	–1.9	–1.2	3.0	3.9	3.8	3.9	3.2	3.7	3.6	3.4	2.9	3.2
1947	X	X	3.8	1.8	4.1	4.9	4.6	4.6	3.7	4.2	4.0	3.8	3.2	3.5
1948	X	X	X	–0.1	4.2	5.3	4.8	4.7	3.6	4.3	4.0	3.8	3.1	3.4
1949	X	X	X	X	8.7	8.1	6.5	6.0	4.4	5.0	4.6	4.2	3.5	3.8
1950	X	X	X	X	X	7.4	5.4	5.1	3.4	4.3	3.9	3.6	2.9	3.3
1951	X	X	X	X	X	X	3.4	3.9	2.0	3.5	3.2	3.0	2.2	2.8
1952	X	X	X	X	X	X	X	4.4	1.3	3.6	3.2	2.9	2.0	2.6
1953	X	X	X	X	X	X	X	X	–1.6	3.2	2.8	2.6	1.6	2.4
1954	X	X	X	X	X	X	X	X	X	8.1	5.1	4.0	2.4	3.2
1955	X	X	X	X	X	X	X	X	X	X	2.1	2.0	0.5	2.0
1956	X	X	X	X	X	X	X	X	X	X	X	1.8	–0.2	2.0
1957	X	X	X	X	X	X	X	X	X	X	X	X	–2.3	2.0
1958	X	X	X	X	X	X	X	X	X	X	X	X	X	7.0
1959														

*Compound rates of growth

Following this procedure, you can find growth rates ranging all the way from —2.3 per cent, between 1957 and 1958, to +8.7 per cent, between 1949 and 1950, along with almost any other rate you would choose for various years and sequences of several years over the postwar period.

For example, if you want to demonstrate that the postwar growth rate through 1953 was less than 4% per year, you take off from 1946, include a drop of 0.1 per cent between 1946 and 1947, and come up with a growth rate for the 1946-1953 period of 3.9 per cent. But if you want to show it was quite high, you take off a year later, from 1947 (which drops out that dismal —0.1 per cent for 1947) and come up with a fine growth rate of 4.6 per cent for the 1947-1953 years.

Statistical Hocus-Pocus

That's what the Eckstein staff did. It took off at one end from a year when there was just about no growth, went to the Korean War boom year of 1953 at the other end, and got that average growth rate of 4.6 per cent. Then it took off from the Korean War boom year of 1953 and ran to the year 1959, when business was recovering from a recession and suffered through a steel strike of 116 days, to come up with its 2.4 per cent growth rate for the second postwar period. As the table indicates, by taking off a year later (1954) the average growth rate would have become 3.2 per cent, and if the take off had been 1949 it would have been 3.8 per cent.

There are those who, in nontechnical terms, would characterize this as statistical hocus-pocus. There are also those who would see in it an element of political hocus-pocus, too. This is because the years 1947-53, when the Eckstein staff found there had been the healthy 4.6 per cent growth rate, were roughly years when we had a Democratic president, while the anemic growth rate of 2.4 per cent it calculated for the subsequent years was for years of a Republican presidency.

Actually it can be shown that the civilian part of our economy has had more rapid growth during the Republican administration than it had during the Democratic years. If military expenditures are subtracted from the national ouput, the resulting growth rate for 1953 to 1959 is slightly higher than for 1947 to 1953.

However, we do not question the *bona fides* of the Eckstein staff. **But we do assert that it has produced a statistical picture of the postwar growth of the American economy which is dangerously misleading both at home and abroad.**

Abroad, the report appears to give official documentation to the propaganda line that the Soviet economy is running rings around the U.S. economy in growth, and that it is Communism a country should choose if it really wants to develop rapidly. Building on a much smaller economic base than the U.S.A., the Soviet Union — as well as almost every less advanced nation in the world — is bound to show a larger percentage increase in output than the U.S.A. But the Eckstein staff calculation gives the Communists ammunition they don't deserve.

Are We Facing A Crisis?

The contrast drawn by the Joint Committee staff in postwar U.S. growth rates suggests that we are facing scarcely less than a crisis through paralysis of our economic growth which calls for drastic remedies. But this, as the full 1947 to 1959 growth record set forth in the table makes clear, is very definitely not the case. Our over-all postwar rate of growth, as measured by the gross national product in physical terms, has been 3.5 per cent per year, a rate nearly double the long-term growth rate of 2 per cent per year between 1909 and 1939. In the continuing fluctuations in the rate of growth which more or less inevitably characterize a relatively free economy, we have had some downs in recent years. **But our economy is now on the upbeat again. And at the end of this year, the U.S. economic growth rate for the postwar period can be expected to be 3.7 per cent per year.**

It is extremely important for the United States to continue to maintain this rate of economic growth or even to surpass it. Upon this effort depends our capacity to meet our defense requirements without dangerous strain, to provide an adequate margin for foreign aid, to improve our own productive facilities, and to continue to raise our own standard of living.

How not only to maintain but possibly improve upon our postwar pace of economic growth will be the subject of strenuous debate in the months ahead. However, the debate will have a much better chance of being constructive if the postwar growth record is seen in proper perspective. To this end one of the first things to do is to junk panic rousing statistical portrayals such as that in the Eckstein report.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

PRESIDENT

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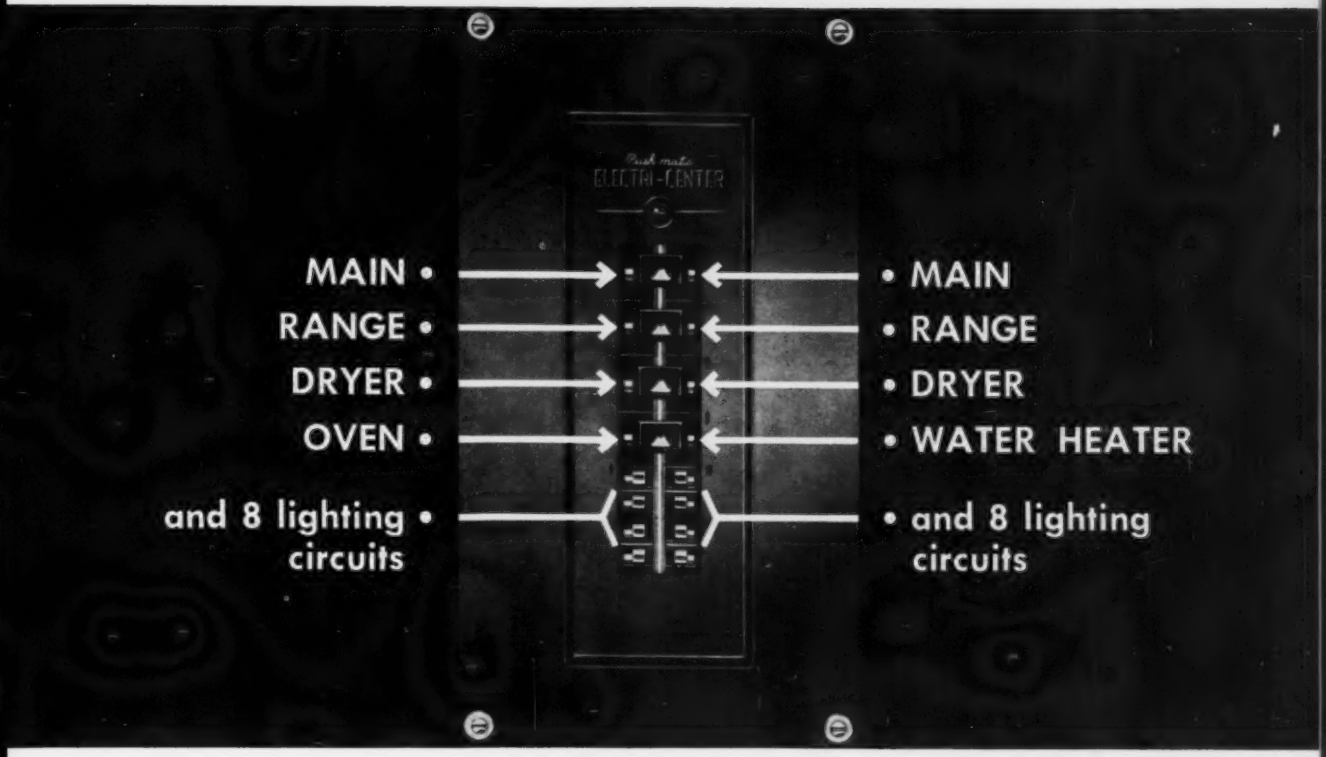
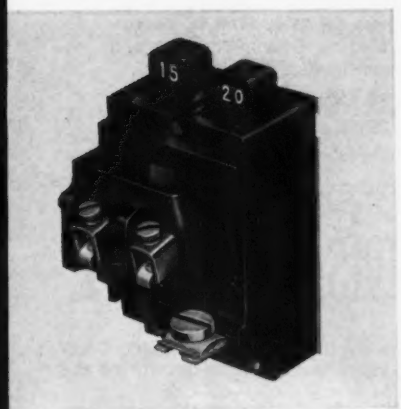


ONLY IN BULLDOG'S 12-CIRCUIT ELECTRI-CENTER®



New Duplex Pushmatic puts two circuits in the space of one single breaker. Gives: identical, independent coil-magnetic protection in each pole of all Duplex breakers; positive one-bolt connection; pushbutton convenience.

Only BullDog Pushmatic circuit breakers give you both of the above combinations—plus many others—in a 12-circuit panel. Other breakers would need a 16-circuit panel.

The BullDog Pushmatic® 100-amp breaker takes only two spaces, compared to the four spaces needed for any competitive 100-amp breaker. And new BullDog Duplex Pushmatic puts two lighting circuits in a single space. Count 'em . . . all the circuits shown in only 12 spaces!

You save space by using smaller panels. You provide the maximum in electrical circuit flexibility and protection. Pushmatic protects two ways—coil short-circuit and thermal overload protection. To put more electrical services into less space, see your BullDog products representative.

Pushmatic 100-amp breakers take only two spaces compared with four spaces required for all competitive 100-amp breakers. Pushmatic 100-amp breakers are now available for field installation.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

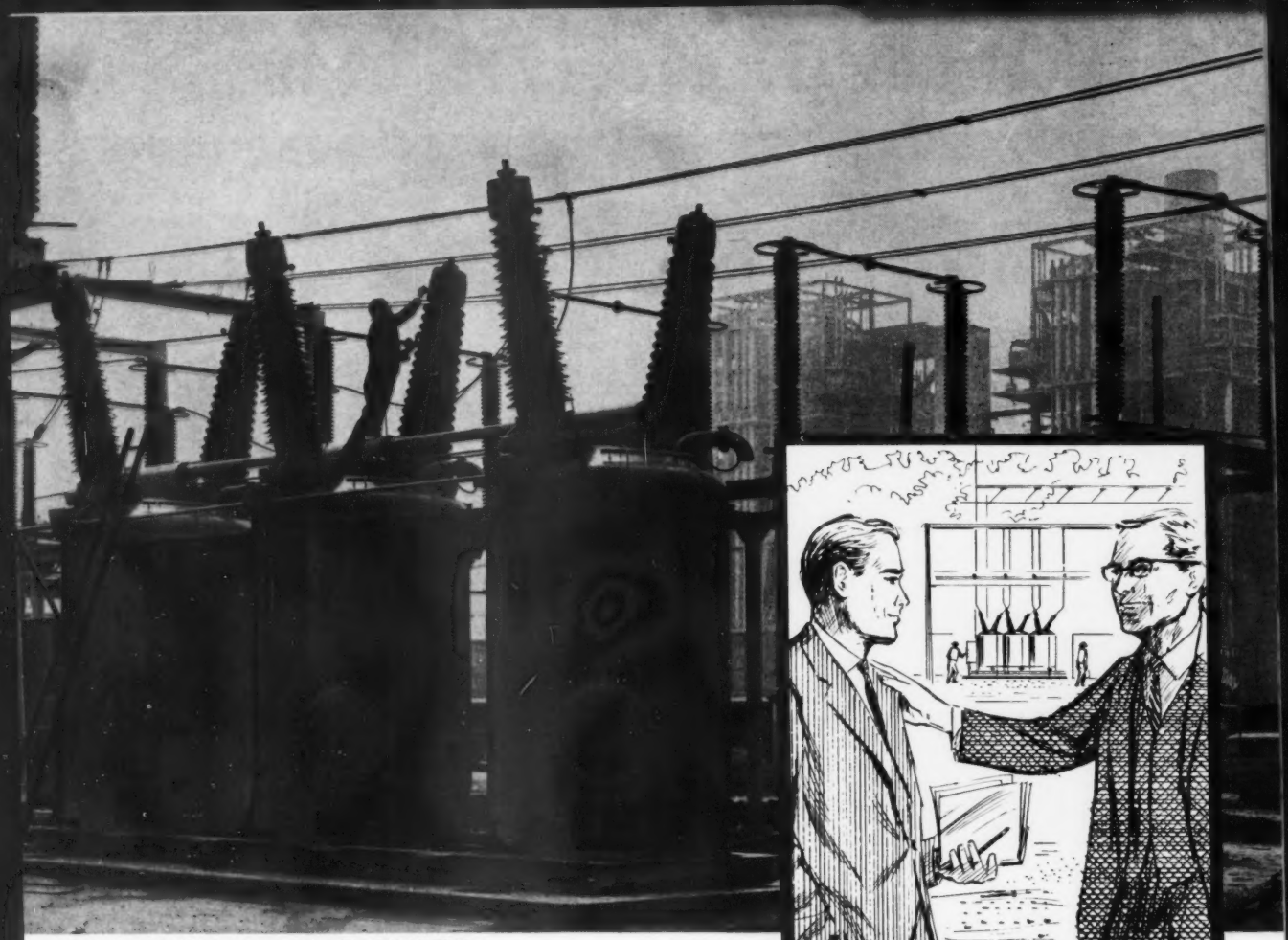
Consult the following Pacific Coast representatives:

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7866
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California



One of four I-T-E, 230 KV power circuit breakers being installed at Southern California Edison Company's new 820-Mw steam station, Huntington Beach.

Doing business for more than 50 years—Southern California Edison Company and I-T-E's Kelman Division:

- **the first 30 KV oil breaker in 1906**
- **the first 230 KV oil breaker in 1937**
- **1000's of breakers between '06 and '60**

ANOTHER JOB WELL DONE...

by the Kelman Power Circuit Breaker Division of I-T-E

When the Southern California Edison Company of Los Angeles decided to boost the output of its new Huntington Beach steam station by adding two computer-supervised turbine-generator units, they selected each of their equipment suppliers with the utmost of care. The successful bidder for four, new, 230 KV power circuit breakers was the Kelman Power Circuit Breaker Division of I-T-E—people with whom this utility has been doing business for more than 50 years.

Back in 1906 the Kelman Electric & Manufacturing Company supplied the then Edison Electric Company with a 30 KV oil breaker. Since that time thousands of Kelman breakers have been put into service as the Southern California Edison Company has expanded its facilities to match the growth of the great California Southland.

Through the years, there has remained the same fine relationship that started fifty-four years ago. It is a business relationship that has been maintained by Southern California Edison Company's insistence on a quality product and I-T-E's determination to continue to supply that kind of product at a competitive price.

For descriptive literature on I-T-E's field-proven power circuit breakers, write to 1667 North Main Street, Los Angeles 12, Calif., Dept. EWE-962-1.

I-T-E CIRCUIT BREAKER COMPANY
KELMAN POWER CIRCUIT BREAKER DIVISION

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7866
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

Meetings Calendar

JUNE

15-17—*Northwest Electric Light & Power Assn.*, Accounting & Business Practice Section, Hotel Benson, Portland.

15-17—*National Conference of Utility Radio*, Continental-Denver Motel, Denver.

16-17—*Oregon Rural Electric Cooperative Assn.*, annual meeting, Gearhart Hotel, Gearhart, Ore.

JULY

17-22—*Los Angeles Summer Market.*

21-22—*Edison Electric Institute-Rocky Mountain Electrical League*, Joint Industrial Relations Committee, Hilton Hotel, Denver.

24-29—*San Francisco Summer Market*, Merchandise Mart.

AUGUST

8-12—*American Institute of Electrical Engineers*, Pacific general meeting, El Cortez Hotel, San Diego.

23-26—*Western Electronic Show & Convention*, Memorial Sports Area, Los Angeles.

SEPTEMBER

7-9—*Northwest Electric Light & Power Assn.*, 53rd annual meeting, Glacier Park Lodge, Mont.

7-10—*Rocky Mountain Electrical League*, annual meeting, Denver Hilton, Denver, Colo.

12-14—*International Association of Electrical Inspectors*, Northwestern Section, Sheraton-Portland Hotel, Portland.

14-15—*Northwest Public Power Assn.*, Accounting Section, annual meeting, Wenatchee, Wash.

18-24—*IAEI*, Southwestern Section, Mapes Hotel, Reno.

29-30—*NWPPA*, Power Use Section, annual meeting, Hotel Monticello, Longview, Wash.

OCTOBER

17-22—*National Association of Electrical Distributors*, Western Region convention, Stardust Hotel, Las Vegas.

23-27—*National Electrical Contractors Assn.*, national convention and exposition, Las Vegas.

NOVEMBER

16-17—*Pacific Coast Electrical Assn.*, Administrative Services Section, Rickey's Studio Inn, Palo Alto.

DECEMBER

12-15—*Atomic Industries Exhibition*, Masonic Auditorium, AIF—Fairmont Hotel, ANS—Mark Hopkins Hotel, San Francisco.

PMC
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OVER 250,000 INSTALLATIONS!
A complete line of precision photoelectric controls & accessories for outdoor lighting.
PRECISION MULTIPLE CONTROLS., RIDGEWOOD, N. J.

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BUCHANAN
SNAP-ON NYLON INSULATORS*

fastest . . . surest splice insulation
(for 2 #18 thru 3 #8 or 2 #6)

2007 for use on 2006S Splice Caps for 2 #18 thru 4 #12.
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Approved for 600 volts on building wire and 1000 volts in fixtures—in applications to 105°C. (221°F.)

- *Best* splice insulation in *shortest* time—*even* on very fine wires,—*even* in extremely cold weather.
- Internal metallic retainers snap over installed Splice Caps and hold Insulators securely. No wrapping. No threading. No vibration worries.
- Completed splices easiest-to-inspect or test—just look through the translucent nylon—or insert test prods from wire end. (See cut-away view above.)

*An exclusive development of BUCHANAN (Patent 2870239)

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Write for Bulletin W-6

BUCHANAN
ELECTRICAL PRODUCTS CORPORATION
HILLSIDE NEW JERSEY

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KEELER WHITE CO.—SEATTLE, WASH.
KEELER WHITE-PORTLAND—PORTLAND, ORE.
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THIS SIMPLE DEMONSTRATION PROVES SF_6 GAS ARC-QUENCHING ABILITY

In this experiment, an arc between two electrodes in the glass tube is instantly extinguished with SF_6 gas when the plunger on the hypodermic needle is depressed. At atmospheric pressure, SF_6 will interrupt a hundred times more current than will air. Because it is an electronegative gas, sulfur hexafluoride quickly captures electrons from the electric discharge, effectively extinguishing the arc.

Properties of SF_6 gas as an arc-quenching medium provide the first major advance in power circuit breaker design in 20 years.

ARC-QUENCHING SF_6 GAS ...KEY TO SUPER BREAKERS

makes possible greatly improved performance from 34.5 kv to 460 kv and beyond

Discovery of the superb arc-quenching qualities of electronegative SF_6 gas has made possible sweeping circuit breaker design advances. Westinghouse breakers using this revolutionary arc-quenching medium are simpler in design, lighter in weight. They are easier to install, more economical to operate, safer and simpler to inspect and maintain than any power breaker on the market today.

Sulfur hexafluoride is highly stable. This assures long life of the gas as both a quenching and insulating medium, even with repeated interruptions. SF_6 has extremely high dielectric strength, recovers full dielectric properties rapidly . . . assures unexcelled arc extinction time after time. SF_6 is inert, nontoxic, nonflammable, odorless . . . entirely safe. Westinghouse breakers designed around the unique capabilities of SF_6 gas are ideal for *all* locations. Quiet operation is assured by the closed gas system.

Westinghouse power circuit breakers using SF_6 gas are basically new breakers. But they have proved themselves at several voltages and also promise the most practical design avenue in capacities of 460 kv and beyond.

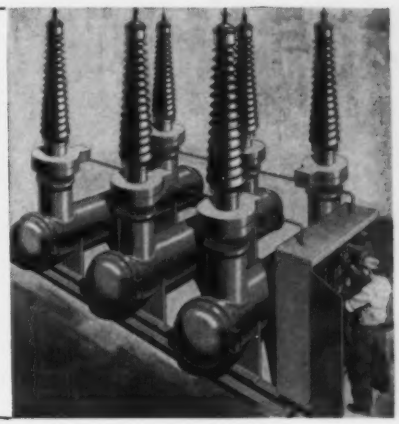
Westinghouse suggests you buy two of these new breakers in widely separated ratings and apply them in entirely different operating situations. Prove to yourself that they will give you combined performance and economy you cannot get in any other breaker.

Call your Westinghouse representative today. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

PROVE THE OUTSTANDING PERFORMANCE OF THIS BREAKER ON YOUR OWN SYSTEM

The principle of circuit breaker design using SF_6 gas has already been proved successful on several operating systems. Breakers from 46 kv to 115 kv have now completed over two years of service.

With SF_6 breakers you get: FASTER INTERRUPTION; EASIER INSTALLATION; SIMPLER, LIGHTER FOUNDATIONS . . . no shock transfer during interruption . . . elimination of oil and size reduction cuts weight up to 65% at 230 kv; DRASTICALLY SLASHED MAINTENANCE . . . SF_6 does not decompose . . . routine inspection only half as frequently . . . interrupter easily removed; COMPLETE SAFETY AT ALL TIMES . . . dead tank construction; QUIET OPERATION . . . no discharge to atmosphere . . . closed system conserves gas, too. J-60967



YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

For phone number of closest representative see advertising index in back of book.

news

Although completion of Seattle City Light's high Gorge Dam on the Skagit is a year away, the spillway section (right foreground) has reached maximum height. The Gorge power house, just below the dam, will be shut down until July 1 while the original intake tunnel is shut off and provision is made to use the new intake. Replacing an existing low-head dam, the new structure extends straight across the river canyon, then swings on a curve to a point about 200 ft downstream

Portland General Electric underground crews unload three of five G-E sealed dry-type 750-kva transformers that will serve Portland's $8 million Memorial Coliseum. Connected load will be 4,200 kw when the project is opened in the fall. An additional 1,000 kw is expected within the next two years

Loren Eisele, systems operation superintendent for Washington Water Power, tries out a new private line telephone circuit to Priest Rapids Dam on the Columbia. Watching are Alan Berry and Archie Fleming of PT&T's Spokane office. Although it can be used for talking, the new system, first of its kind in the state, is primarily for telemetering data indicating the amount of power being delivered to company transmission lines

Ralph Conver, left, and John Bond, Portland General Electric commercial cooking specialists, check a counter oven during the company's Cavalcade of Cookery

EW

Pipeline Project Is Approved Conditionally

The Federal Power Commission presiding examiner has conditionally approved the pipeline project designed to bring an average of 584 million cu ft of natural gas per day from fields in Alberta, Canada, into the United States for ultimate consumption in California and the Pacific Northwest states.

At the same time, Pacific Gas and Electric Co. officials say that the $338 million, 1,400-mile pipeline can be started this summer if all approvals are received. According to officials of Bechtel Corp., most of the design has been completed and the entire 1,400 miles have been surveyed and land acquisition is under way. Two construction seasons will be required to complete the job.

► **Pacific Power & Light** Co.'s pioneering effort to develop water resources in the Coos Bay area, in an effort to attract industry, has paid off. The Menasha Wooden Ware Co. plans construction of a mill this spring. Pacific Power will supply both water and power to the new mill.

► The board of directors of the **Bay Air Pollution Control District** have enacted into law a regulation designed to control industrial air pollution. The district, under state law, is empowered to establish and enforce pollution control regulations in six Bay area counties. The regulation will be aimed at control of emissions from industrial, incineration, materials handling and heating and power generation stations.

► The **Federal Power Commission** has issued a 24-month preliminary permit to Nevada Irrigation District of Grass Valley, Calif., for a proposed hydroelectric development in Sierra, Nevada and Placer Counties of California. Total power output of the development would be 55,000 kw. The district indicated that power generated from the project would be sold to the Pacific Gas and Electric Co.

► Construction is scheduled to begin in June on a $500,000 operating headquarters at Bellingham for **Puget Sound Power & Light** Co.'s northern division. The project will include an office building and a separate building housing an auto shop and service areas. It will be adjacent to an area already developed by the company as a mechanical pole yard.

► The Golden Year of Theodore Roosevelt Dam is being celebrated by the Salt River Valley Project of Phoenix, Ariz., to commemorate the finishing on March 18, 1911, of that famous dam. President Theodore Roosevelt started the turbines on that day. Planned for the 50th anniversary on March 18, 1961, will be an antique automobile trek over the Apache Trail from Phoenix to the dam site similar to the one originally made when the dam was completed.

Adds Large Computer

The Arizona Public Service Co. has announced plans to install a second large-scale electronic computer. Some years ago, APS made the news with the purchase of a Univac computing system which it thought to be sufficient for many years. Commenting on the situation, Walter Levi, computer services manager for the utility, said that the present machine meets only 25% of the engineering needs of the company. The new machine will be housed in the company's computer center. No increase in personnel will be required and it is anticipated that the new machine will pay for itself by 1964.

► **Peace River Power Development** Ltd.'s W. C. Mainwaring has stated that the application for development of the Peace River power resources will not receive a public hearing until September. The B. C. water rights branch has already said that the development is feasible from an engineering standpoint, but the company must produce financial people who will testify that they are willing to back the project.

► **Inland Power & Light Co.**, Spokane, is negotiating for the sale of its power lines north of the Tacoma Creek area in Pend Oreille County to the Pend Oreille County PUD.

The Indian Wars

The Navajo Indians are carrying on a centuries-old feud with the Hopi Indians in Arizona by blocking construction of a power transmission line to the Hopi reservation —which is surrounded by the Navajo reservation. The Hopi chieftains have granted Arizona Public Service a franchise to serve its villages but the Navajos won't grant permission for a transmission right-of-way unless APS agrees to sell its lines to the Navajo when and if they decide to buy them.

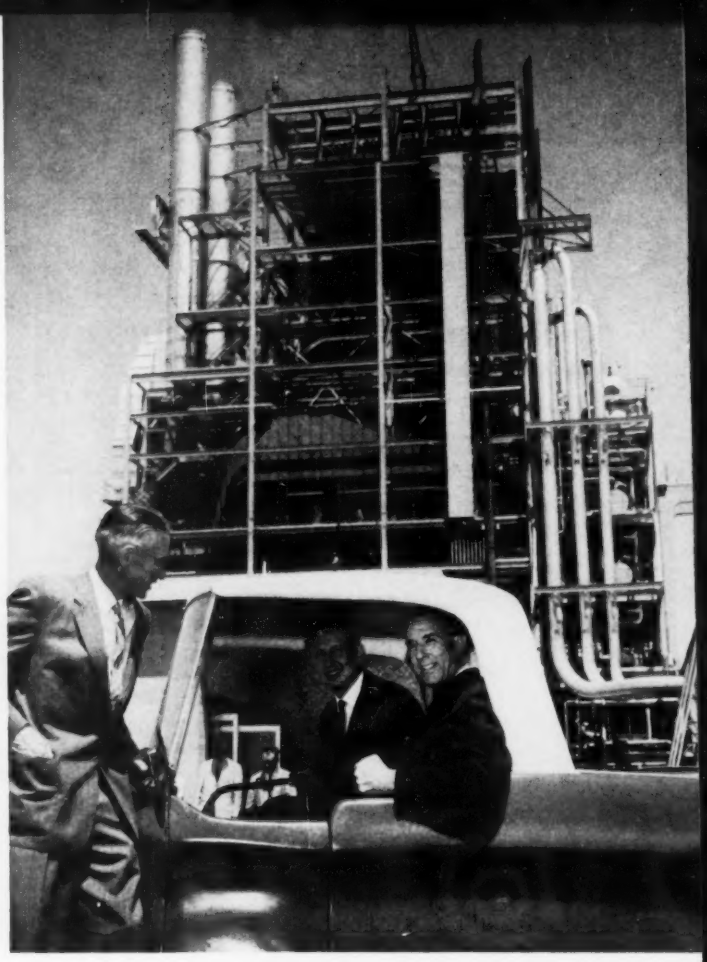
► H. Zinder & Associates, consultants to the Kittitas County PUD of Ellensburg, are negotiating with the Northern Pacific Railway Co. for a **two-year extension of leases on coal mines** in the county to furnish coal for a **proposed steam generating plant.** Present leases held by the PUD expire July 1. A state-financed study by Zinder indicated feasibility of a 250,000-kw plant selling power at 5 mills per kilowatt, in combination with surplus power from the Bonneville Power Administration. Original plans called for completion of the plant in 1963 but this date has been changed to 1964 or 1965, according to Earl Coe, state conservation director and an ex-officio member of the state power advisory committee.

► The B. C. Electric Co. has been awarded a **certificate for its medical health program.** The B. C. Electric health service enables employees to get an early warning of health defects which could prove hopeless if not diagnosed at an early stage. The service far exceeds normal standards for company health programs.

► **B. C. Electric** office workers will get an 8% wage increase going into effect as follows: 3% increase over an eight-month period retroactive to Feb. 1; 3% during the next eight-month period; and 2% during the final seven-month period. Additionally, employees with more than 25 years service will get a fourth week of vacation.

► **BPA** energy sales increased 5.2% in 1959 over 1958. Revenue was up 5.8%.

ELECTRIC CAR is tried out by Arizona's Gov. Paul Fannin, and APS President Walter Lucking (center). Board Chairman John Jacobs watches the proceeding



TURBINE DECK was open to the public. Shirts worn by company guides were designed for the occasion

RIBBON CUTTING opened Ocotillo plant. President Lucking, Mayor Hugh Laird of Tempe and K. M. Ziegler, APS manager, officiated

THERE WAS SOMETHING FOR EVERYONE AT THE OCOTILLO OPEN HOUSE

More than 10,000 customers, stockholders and employees of Arizona Public Service Co. visited the new 220,000-kw Ocotillo power plant at Tempe during a four-day open house celebration. The company's annual meeting, held in a tent at the plant site, started off the activities. Later the public was invited to tour the plant and see new service equipment and appliances of the future. Photos on these pages will show a few of the attractions set up outside and in the large tent.

CURT, the clown, entertained youngsters with fun and balloons, giving their elders a chance to view the plant and exhibits

LINEMAN ready for the job was feature of one tent display. Pole-top resuscitation, demonstrated outside, drew crowds

APS HOST Charles G. Ekstrom and stockholders visit in front of portable transformer display

CONTROL ROOM of Ocotillo power plant was inspected by small groups under employee guidance

► **City of Los Angeles** power customers rates will be reduced two-tenths of a mill per kwh during May and June. The reductions were made possible through an automatic fuel adjustment clause that causes rates to go up and down with fuel costs.

► **California Oregon Power** Co. has applied to the Oregon and California regulatory bodies for a rate increase of approximately $1,280,000.

► A total of 77,519 customers of **California Electric Power** Co. received a small reduction in rates recently following a decision by the State Public Utilities Commission.

► **Portland General Electric** and **Pacific Power & Light** companies have filed new rates in Oregon in keeping with increased gross revenues granted by the PUC. PGE was awarded $1,924,723 over 1959 income, a 4.8% increase. PP&L was granted $3,544,556. The increases amount to a 6.2% rate of return for PGE and 6.1% for PP&L.

► The **Snohomish County PUD** has announced residential rate reductions averaging 8½% to become effective June 1. Other reductions are being made effective for commercial and retail power customers.

► **Washington Water Power** Co., Spokane, has been granted an 8% rate increase by the Idaho Public Utilities Commission. This increase, which will add $830,000 annually to the company's income, is similar to the action taken a week previously by the Washington Public Service Commission in allowing an 8% increase for the utility's Washington customers.

► **O'Connor Office Building,** completed about April 15, promises to start a new trend in such buildings in Los Angeles. Located at 11669 Santa Monica Blvd., it is an all-electric building containing 17 office suites and a parking lot with lighting based on an estimated 5 w per sq ft, heating and cooling by five heat pumps totaling 15 tons, with individual electric water heaters. General contractor was Kermit Kuck. Architect is Max Starkman. Electrical plans consultants were Robert Holmes and Harrison Lee, Los Angeles Department of Water & Power.

► **Snohomish County PUD** will build its third district office building this summer, at Monroe, according to Manager A. S. J. Steele. Cost will be approximately $90,000.

Financial Briefs

► Generation at 13 U. S. Columbia River plants produced over 30 billion kwh of electric energy for **Bonneville Power Administration** during fiscal 1959. Gross operating revenues totaled $68,135,000, an increase of $1.4 million or 2.11% over 1958. Looking forward to the forecasted fiscal situation through 1964, BPA officials estimated that revenues for the forthcoming five-year period would be adequate to meet system payout requirements.

► **Public Utility Districts** operating in Washington showed a substantial increase in power sales, revenues and numbers of customers served in 1959, according to a report prepared by R. W. Beck & Associates, utility analysts and engineers. According to the report, the state's 22 PUD groups sold 4.8 billion kwh in 1959, with revenues of $41,900,000 from 236,890 customers. This represents an increase, the report indicates, of 13% in sales of power, 10% in revenue and 2% in number of customers over 1958.

► **San Diego Gas & Electric** Co. earnings for 1960 will be $1.80 to $1.85 a common share, E. D. Sherwin, president, predicted in a stockholders' report. He said the estimate is based on the present 4½ million shares of common stock outstanding, no additional sale and normal weather conditions. The 1959 earnings were equal to $1.83 a share,. Electric customers increased 7½% to 315,847. Net income was $8,821,389, an increase of 33.4% over 1958.

► The Federal Power Commission has approved the bid **Puget Sound Power & Light** Co. will accept for its sale of $20 million principal amount of first mortgage bonds, due 1990.

► Earnings on **Arizona Public Service** stock rose last year from $1.88 to $1.92.

► The board of directors of the **Sacramento Municipal Utility District** have sold $30 million in revenue bonds as part of the financing for the district's Upper American River project. It was the second series of an $85 million revenue bond issue authorized by the voters in 1955.

► California Electric Power Co. has boosted its quarterly dividend from 20¢ to 21¢. President Carl Ernst reports that the utility's growth over the past 10 years has increased 250%.

Growth

► The following **REA loans have been approved** for developments in the Western states. Lincoln Electric Co-op. Inc. of Davenport, Wash., has received $354,000 to finance the construction of 29 miles of distribution line to serve 60 new customers. Ravalli County Electric Co-op. Inc. of Corvallis, Mont., $200,000 to finance 27 miles of distribution and 56 customers. Inland Power and Light Co., Spokane, Wash., $889,000 to finance the construction of 60 miles of distribution line serving 430 new customers.

► The city of **Everett, Wash.,** and **Snohomish County PUD** are arranging final details of a joint venture to develop the water and power resources of the Sultan River. Under the arrangement, the city will get 330 million gallons of water per day and generating capability of 140,000 kw will be developed.

► Morrison-Knudsen Co. has received an $800,000 contract for the first stage development of **Utah Power & Light** Co.'s cooling water dam on the Hamsfork River near Kemmerer, Wyo. The dam will supply water for Utah Power's steam-electric development. First stage of development will be 150,000 kw.

► Contractors have been invited to bid on construction of the 100,000-kw **Trinity power plant** and the 134,000-kw **Clear Creek power plant** of the Central Valley project.

► **Pacific Gas and Electric** has announced plans to double the capacity of its Morro Bay power plant. The plans include the addition of 325,000 kw of generation which will cost more than $40 million. Work will commence in January of 1961 and will be completed in the winter of 1962. The new unit will require additions to the present plant's sea water evaporation equipment. The new evaporator will make the plant self-sufficient for fresh water.

Nuclear News

50-Emw Nuclear Power Plant Proposed by Municipals

The Los Angeles Department of Water & Power and the Pasadena Municipal Light & Power Co. jointly filed a proposal on April 29, with the Atomic Energy Commission for the construction of a 50,000 electrical kilowatt nuclear power plant.

The type of reactor to be used in this plant is known as the "improved cycle prototype boiling water reactor." The selection of the manufacturer for this reactor system will be made by the Atomic Energy Commission. Present financial arrangements call for the commission to pay an estimated $10 million for the reactor complex that it will own. Los Angeles and Pasadena will each invest an estimated $5 million for the power generation facilities.

Condemnation proceedings have been started for the proposed plant site, which comprises 1,170 acres in San Francisquito Canyon north of Saugus. The city of Los Angeles will pay for and own the site.

A decision by the Atomic Energy Commission on this joint proposal is expected by the end of July.

Nation's Largest Operating Nuclear Power Plant

During the last two weeks of April, the Dresden nuclear power station produced nearly 25 million kwh of electricity for the Commonwealth Edison Co. system in northern Illinois. The plant operated at power levels up to 90,000 ekw (one-half design level—as specified in the operating license).

The reactor performed satisfactorily during this initial test run and was reportedly easy to operate and exceptionally stable. The plant was shut down for a planned examination of its nuclear components. Upon completion of analysis of the data obtained during this test run and a thorough checkup, the plant will be ready for the next phase of power operation. Upon receipt of authority from the commission, the next phase will see the plant brought up in gradual steps to its full power rating of 180,000 kw.

► **Increasing reliability** was the subject of a recent meeting between the military and manufacturers. Western communication engineers with plenty of wide open spaces and poor travel conditions much of the time have long wished for equipment that would stretch the time for maintenance to the maximum permitted by law. One utility records an instance where it cost more than $100 to replace a very minor component during inclement weather conditions. No doubt others could top this easily.

Frontiers of Atomic Energy Research Hearings

Dr. D. I. Spinrad, Argonne National Laboratory, told the subcommittee on research and development of the joint committee on atomic energy that the increased carbon dioxide from fossil fuel energy sources is perhaps a more disturbing factor in our environment than nuclear fission products.

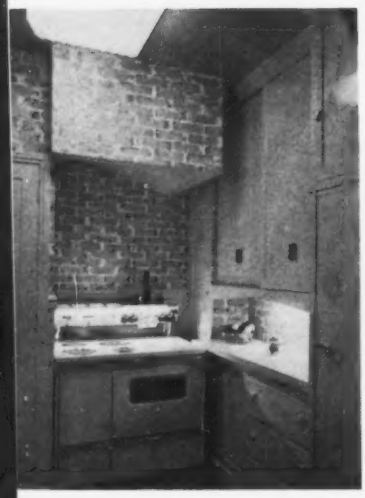
At these same hearings, Dr. A. E. Ruark of the AEC stated that it was his belief "that we shall obtain thermonuclear temperatures in a relatively short term of years." He explained, however that "this belief should not be confused with the general verdict of thermonuclear physicists that 10 to 20 years might be required for development of the first fusion power plant. Indeed, no one can say with certainty that this second step will be feasible."

► **The Martin Co.** has started critical tests of the core for the nuclear reactor that will be installed at the air force station near Sundance, Wyo., in 1961. This system, which comes in 16 air-transportable units, when in operation will produce 1,000 kw of electricity and 7 million Btu per hour of steam heat for this station.

Market Development

San Diegans Get Modern Ideas at Bureau Fair

Here are a few of the 135,000 who saw the 1960 version of San Diego's annual Spring Fair of Modern Ideas, sponsored by the Bureau of Home Appliances. The crowd here is watching a stage presentation featuring the Miss San Diego finalists, hostesses for the fair. An outstanding feature this year was the Medallion Home, above, put in by the Contractors Division



IN THE NEW, ebony and pastels are lighted to give daytime charm at night. Utility too is served by light for living

CONTROLLED light in dining area above and bedroom-study below gives flexibility

RELIGHTING

A believer herself in light for living, Marguerite Fenner, director of home economics for Pacific Gas and Electric, comes from a company that has been active in the promotion of residential lighting. Therefore, when she decided to redecorate her Russian Hill apartment in San Francisco, it was natural that she should think first of light and color.

The result is a skillful combination of colors and textures that do not become faded and obscured at night. Planned lighting retains the spaciousness and charm given out in daylight.

Since light for living means just that, flexibility has been provided. There are levels for conversation, TV viewing, reading or close work.

A lighted valance along one wall of the living room gives a feeling of sunshine on a dark day. It has two rows of de luxe warm fluorescent tubes (200 w) separately switched to give high and low levels of illumination. A pin-hole down light recessed in the ceiling brings out the beauty of a painting over the sofa. Table lamps use 100-150-250-w bulbs.

Walls, drapery and floor coverings are pale gold, making a setting for furnishings of ebony combined with blues, lime and eggplant in upholstery and accessories.

In the dining room, where a partition was knocked out to give spaciousness, cornice lighting on one wall and over a window highlights bamboo wallpaper and gold draperies. The soft, comfortable light is right for dining and, combined with

PHILCO air-wrap
Ends costly waste of food!

IN THE OLD, a dark background was lighted to give comfort for reading with 1,200 w

FOR LIVING

the pin-hole in the living room, gives glareless illumination for watching TV.

The bedroom study has 240 w in a new type ceiling fixture with glass diffusing bowl and 300 w in a three-light pole lamp by the desk. A floor lamp has a 100-200-300 bulb and a bedside table lamp, 100-150-250 w.

It is impossible to work in a shadow in the kitchen, which uses fluorescent overhead, under cupboards and over work counters.

This was not Mrs. Fenner's first experience in decorating with light. The gold and ebony setting replaces one of dark colors, blended with blonde furniture. The old apartment was proof that adequate lighting can be secured against a dark background. But, says Mrs. Fenner, she never burned less than 1,200 w.

Medallion Program

An 8-point program to help sell Medallion Homes has been introduced by Hotpoint. It offers: (1) benefits of electric baseboard heating; (2) Honor Home Merit Award for builders; (3) advertising, displays, brochures; (4) kitchen planning service; (5) training films; (6) publicity aids; (7) supplier support by coordinating trade allies; (8) Hawaiian holiday awards to builders in each sales region for best merchandising job.

► Although home building is off slightly in the West, home starts continue strong with a **decided upturn in Medallion Homes,** according to F. M. Falge, Western regional manager for G-E's residential market development operation. In the Western area, under the company's program, 1,557 bronze and 1,331 gold Medallions have been signed up and several times the number are in the planning stage, he reports.

► Sales of non-residential air conditioning and heat pumps in southern California are **increasing at a rate of about 8% annually** and will reach $38 million by 1965. This is the prediction of Richard V. Southworth, manager of a new Los Angeles factory branch of Typhoon Air Conditioning Division, Hupp Corp. John A. Gilbreath, Typhoon sales vice-president, said that packaged air conditioning has been steadily dropping in price in recent years while most durables have risen. As an example he cited the 15-ton unit, costing about what a 10-ton unit did in 1950 and giving more cooling per ton.

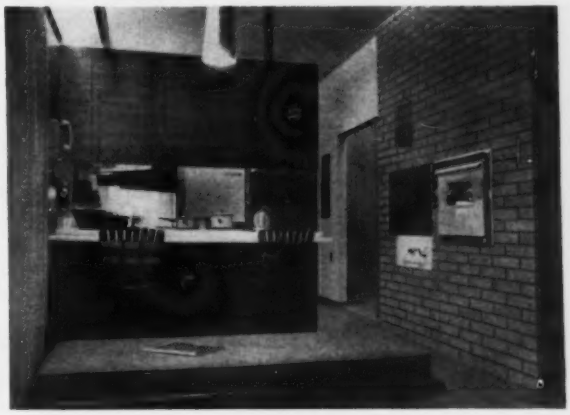
► Sunbeam has extended its **distributor-agent consignment test program** from three to eight Western states. The market testing program under which dealers are contracted for appliance sales has been in operation in California, Oregon and Washington since early 1959. It will now be effective also in Arizona, Idaho, Montana, Nevada and Utah. According to Vice-president Clifford Mendler, experience is not yet sufficient to warrant extension across the entire country.

►**A single service charge and pricing system** for repair, replacement or adjustment of kitchen-laundry appliances has been announced by Hotpoint. Core of the new system is a job pricing manual listing charges for the complete job. There is a flat rate for making a house call, varying nationally from $3.50 to $5.50. Hotpoint guarantees labor for 30 days and parts for one year.

► A 13-cu-ft refrigerator-freezer **uses about 1,300 kwh per year,** about 800 kwh more than an 8- to 10-cu-ft refrigerator, NEMA's Household Refrigerator and Freezer Section reported in introducing its 1960 promotion package. Noting that the refrigerator load is the utility's biggest residential load builder, a report to utility executives carried the program built around the theme, "An electric refrigerator-freezer is a supermarket in your kitchen."

► July 24-29 are the dates for the **San Francisco Summer Market** at the Western Merchandise Mart.

Total Electric Modeled at Portland Home Show



A feature of Portland's Home Show was a total electric home built by PGE and Westinghouse. The kitchen with its built-ins was a special attraction during the 10-day showing. In a treasure hunt, Westinghouse gave away electric appliances and equipment to contestants who found hidden words forming a quotation about homes

Frances Harvey, right, Umatilla County, Ore., extension home economist, is shown new refrigerator by Margaret MacArthur, home economist for Pacific Power & Light Co. at EWRT equipment show

1960 Models Seen At Portland Show

Home appliance manufacturers presented 1960 models to county agricultural extension service home economists from three Northwest states recently at a three-day equipment show in Portland, sponsored by the Electrical Women's Round Table, Oregon Chapter.

Co-hosts for the show, held in Pacific Power & Light Co.'s auditorium and demonstration kitchen, were PP&L, Portland General Electric and the Clark County PUD, Wash.

Participating were appliance demonstrators and manufacturers' representatives who also presented home lighting, electric heating and air conditioning talks and films.

► **Sylvania Electric** has announced availability of its new Panelescent night light, which operates on the electro luminescence principle. Drawing about 1/200th of a watt, the light costs less than 1¢ a year to operate and has a five-year life rate of continuous operation, the manufacturer reports.

► Dean C. Haggardt has been made Pacific Northwest regional sales representative for **KitchenAid Home Dishwasher Division,** Hobart Mfg. Co. He succeeds Carl Eves Jr., who has been transferred to the Southeastern region. Haggardt's headquarters will be in San Francisco.

Heat Pump and Air Conditioning Show Builds Sales

Portland General Electric Co.'s third annual Heat Pump and Air Conditioning Show drew more than twice the number of interested contractors and homebuilders of the preceding shows. Enjoying some intramural fun at one of the 21 exhibits are Bob Seaburg (left), PGE heat pump and air conditioning sales representative, Harold Sweet, General Electric, Seattle, air conditioning and heat pump sales, Norm Donaldson, General Electric

In This Case Better Buy Her an Electric Dryer

This overworked victim of washday blues, here featured in a Department of Water & Power window, appeared in newspaper ads, outdoor advertising and other promotional material to push the department campaign slogan, "Better Buy Her an Electric Dryer." This drive netted sales that ran more than 50% above quota and brought more than $18,000 EAR. The window display in the department's downtown Los Angeles office building was duplicated at six other locations. The newspaper ad, appearing in seven Los Angeles dailies and 57 community papers, pointed out that no special wiring was needed but that for even faster drying the user might want 240-v service; advised "ask your dealer about DWP's special $25 wiring allowance and Wire-on-Time payments plan"

Blast for Business

Flair, a free-standing range designed to give a built-in look, was the star at Frigidaire's recent "Blast for Business" dealer showings in the West. Four models are topped by a 40-in. Custom Imperial with two ovens, automatic controls and other conveniences. A 30-in. model with large single ovens comes in Custom Imperial and Deluxe.

At the showings in San Leandro in the Bay area, sales promotion manager J. H. McKenna and his staff put real punch into showing the range, the dishwashers, refrigerators and other 1960 products. McKenna pointed out that in a six-month period sales of refrigerators went up 3.9%, food freezers more than 40%, built-in ranges 70% (free standing were off 5%), laundry equipment 4%.

Faked blasts and other stunts gave plenty of action and pointed out the moral – salesman action is needed. As one speaker said, "you can't do business from an empty wagon so don't ring the bell unless you have something to sell."

Flair's cooking surface is concealed in the counter and pulls out like a drawer. Above-counter-height ovens have doors that glide up out of the way, leave room for the tallest utensils. The optional white cabinet gives storage room and puts the range at a handy 4 in. below standard countertop

Post Lamps Sell

Seattle City Light sold more than 250 post lamps during the first 10 days of a special introductory offer to promote better walkway and yard lighting.

The offer allows a customer to buy a new photoelectric cell-controlled post lamp fixture for $15 and have it installed within 35 ft of his house for another $50. Two types of lamps are available. Either one includes a weatherproof outlet, which can be used for connecting outdoor appliances.

City Light promoted the lamps at the Seattle Home Show and in its radio advertising of the show.

► Modernization plans for the **Western Merchandise Mart at San Francisco** have been announced by the Kratter Corp., lease owners. Improvements, to cost some $1,500,000, will include an addition.

► **A contemporary styled wall thermostat,** the Elegance, has been introduced by the White-Rodgers Co. as an addition to its electric heat control line. Finished in gold and beige vinyl-leather, the type 1A65 was styled to blend with any decor. Thermal element reacts to radiant heat as well as to air temperature. Control knob is the element. In addition to a heat range selection of from 55 to 85 F, the unit has a cold position. With the dial at cold, one side of the power line is automatically disconnected to shut down the heating system for week-ends or vacations. The thermostat mounts flush with the wall, extending outward 1 in. It is 4¾ in. high; 2⅞ in. wide. Electrical rating is 2,500 w, 120 v a-c; 5,000 w, 240 v or 277 a-c.

► **G. L. Call,** manager of Graybar's central Pacific district, has been elected president of the Northern California Electrical Bureau. Other officers for the year: **R. M. Sanford,** A. H. Meyer Co., vice-president; **O. R. Doerr,** Pacific Gas and Electric Co., secretary; **Henry A. Adams,** Western Merchandise Mart, treasurer; **John S. C. Ross,** Pacific Gas and Electric Co., chairman of the executive committee; and **Bert W. Reynolds,** manager.

Communications

► **Radio operator's permits** are not required in the industrial services for operation of base radio station control points on frequencies above 25 mc since April 25, 1960. Details of the changes to paragraphs 11.107 and 11.154 can be found in the **Federal Register** of April 20, 1960. Electric utilities, who as a whole have conscientiously followed regulations, will find this a welcome relief.

► **Tellurometer Inc.,** U. S. distributor for the radio distance measuring device that is made in South Africa, has petitioned the FCC for permission to operate a new version of the instrument in the vicinity of 10,000 mc. The older equipment, which has received wide usage in the past year, operated at approximately 3,000 mc and caused quite a revolution in surveying practices where distances up to about 50 miles were involved. Apparently the higher operating frequency will result in greater accuracy.

► **Miss Mary Jane Morris,** secretary of the FCC for the past six years, has resigned to enter private law practice. Somehow, a "Miss" as secretary for this august body made it easier to engage in correspondence.

► **Montana Power Co.'s** communication system suffered severely from the heavy snow storm and icing that occurred the last of April. Broken conductors interrupted physical circuits and ice loads up to several inches in diameter caused a 7,200-v distribution to fall into telephone circuits feeding one microwave station, with some damage to equipment. In spite of the icing of dishes and hook feeds, there was only one suspected cause of partial path failure and this was of short duration.

► **Solar cells** with conversion efficiencies as high as 13 to 14% have been announced by Hoffman Electronics. This is 50% greater than previous cells have attained; however, the price of approximately $6 per sq cm makes them a premium power source just now. Nevertheless, when used with suitable storage batteries and low drain transistorized radio equipment, they offer possibility as a power source in much of the arid southwest.

► **Utah Power & Light Co.** recently placed a new two-hop Motorola microwave system in operation at Salt Lake City. The hops are quite short, being 5½ miles between Terminal substation and 30 South substation and 4½ miles between 30 South substation and McClelland substation. At the present time, only relaying channels are in operation and consist of MC22 multiplex for two-way permissive trip on each hop and a transfer trip channel for transformer protection on 138-kv lines.

Association Affairs

Explaining the self-training program for management of electrical contracting businesses now developed by the National Electrical Contractors Assn., E. R. "Al" Cornish, NECA research and education director, recently told several Far Western chapters how they could establish such courses as workshops locally with leadership from NECA staff. At cagey old San Francisco Chapter, his talk stirred up interest and one of the courses is being planned to start in the near future

► **Rex G. Thurber,** assistant to the chief of design of Bonneville Power Administration, was elected president for 1960 of the Electric Club of Oregon at its annual business meeting Dec. 3 in Portland.

Thurber

Other new officers are Fred A. Waker of Crouse-Hinds Co., first vice-president; Kenneth B. Robinson of Westinghouse Electric Corp., second vice-president; and Mel H. Evans, Portland General Electric Co., sergeant-at-arms. Leonard A. Kallen, retired, was re-elected secretary and Harry L. Clark, Portland General Electric, re-elected treasurer. Retiring president is Joseph H. Liebrich of Pacific Power & Light Co.

► **Electric Club of San Diego** elected C. J. Nevitt, superintendent of distribution, San Diego Gas & Electric Co., to succeed R. W. Rohrbach, Pacific Wholesale Electric Co., as president. Norman D. Ferguson, California Electric Works, was named first vice-president, J. W. Kerr, San Diego Gas & Electric, second vice-president, and T. L. Melrose of the same company secretary-treasurer.

► Triple honors were accorded **Seth Cohn,** 82-year-old San Mateo electrical contractor, at the graduation dinner for 16 apprentices April 2 in Burlingame. Cohn retired after 15 years as head of the **San Mateo County Joint Apprenticeship Training Committee** for the electrical industry. A scholarship in his name at the College of San Mateo, a plaque extolling his leadership and a life membership in the San Mateo County Chapter, NECA, were given to him. Stanley A. Fitschen, Belmont contractor, succeeds Cohn as chairman. W. H. Diederichsen, business manager, IBEW Local 617, was master of ceremonies. Speakers included Charles F. Hanna, chief of the State Division of Apprenticeship Standards, who predicted that today's completing apprentice will be a foreman or supervisor within five years, so great are the opportunities created by population growth on the San Francisco Bay peninsula. Donald Vacchieri, San Carlos, representing the graduates with a final examination grade of 95 plus, was valedictorian speaker, pledging good citizenship as well as good mechanics. The class averaged 85, highest in local records.

Fitschen Cohn

When four new members of Electric Club of San Diego were to be inducted C. J. Nevitt, president (standing behind them), asked Norm Ferguson, vice-president, to make the installation. They were J. H. Tuttle of Cutler-Hammer, T. I. Jarrard, F. P. Williams and R. L. Townsend of SDG&E, who filled the power company quota of members

GENERAL ELECTRIC ANNOUNCES...

A NEW METHOD OF TRANSFORMER RATING

DEVELOPED SPECIFICALLY TO LET
YOU TAKE FULL ADVANTAGE OF
THE BENEFITS OF GENERAL ELECTRIC'S
PERMALEX INSULATION

DISTRIBUTION TRANSFORMERS

NETWORK TRANSFORMERS

MEDIUM TRANSFORMERS

General Electric's new rating method gives you higher kva ratings, with full operating life, at no extra cost.

GENERAL ELECTRIC

Using General Electric's new transformer rating method, you utilize

Greater kva capacity with Permalex* insulation

Permalex insulation was developed in G-E laboratories, and reported to the industry in AIEE paper TP-60-58 over a year ago. But standard rating systems have not permitted some users to fully realize the benefits of this outstanding insulation system — until today.

Now General Electric announces a NEW method of rating transformers, specifically designed to let you take maximum advantage of the higher kva capacity possible with Permalex insulation.

An additional higher kva rating now appears on G-E oil-filled distribution and network transformers.

*Trademark of General Electric Company

GENERAL ELECTRIC'S PERMALEX insulation gives you more kva — at lower cost-per-kva. Photo at left shows new 55° ● 65° label which identifies G. E.'s new dual-kva distribution transformer.

For example — a transformer formerly rated 25 kva is now rated 25/28 kva — indicating that you get the full benefits of a 28 kva unit from a General Electric transformer ASA-rated at 25 kva.

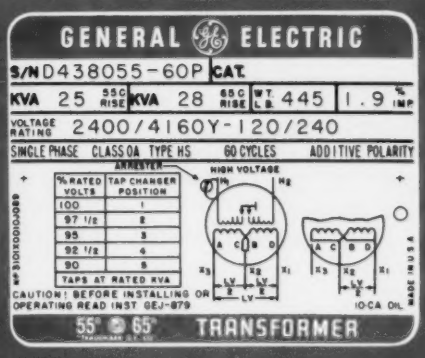
The nameplate is labeled **55° ● 65°** to show the corresponding average winding rises associated with these two kva ratings. Here are sample ratings: 50 kva is now 50/56; 250 kva is now 250/280; and 750 kva is now 750/840 kva. Permalex insulation enables you to base your transformer utilization on the higher load and temperature with no sacrifice in transformer life.

Using the new higher kva rating, you can now apply the full benefits of Permalex insulation *according to your established loading practices.* Since you get more kva capacity at no price premium, you can realize substantial savings on cost-per-kva.

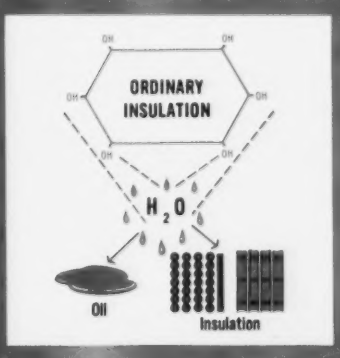
Your General Electric Sales Engineer can give you a dollars-and-cents breakdown of the actual savings *you* can get. Contact him today, or write for bulletin GEA-7047 to Section 482-05, General Electric Company, Schenectady 5, New York.

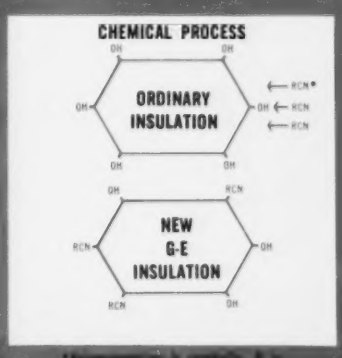
GENERAL ELECTRIC

NEW NAMEPLATE shows ASA standard 55C rise kva rating, plus General Electric's new kva rating based on 65C rise — made possible by Permalex insulation.



HERE'S WHY Permalex insulation allows transformer operation at 65C winding rise. Chemically modified insulation in G-E Permalex system drastically reduces formation of water which attacks turn and layer insulation in ordinary systems.





FULL-VALUE
CERTIFIED
TRANSFORMER
GENERAL ELECTRIC

- Superior design, features, and performance
- Faster shipment
- Complete service

HERE ARE THE NEW RATINGS

	55C Self-Cooled	65C Self-Cooled	65C Fan-Cooled
1φ	833 kva	933 kva	1073 kva
	1250 kva	1400 kva	1610 kva
	1667 kva	1867 kva	2147 kva
	2500 kva	2800 kva	3500 kva
	3333 kva	3733 kva	4666 kva
	5000 kva	5600 kva	7000 kva
3φ	750 kva	840 kva	966 kva
	1000 kva	1120 kva	1288 kva
	1500 kva	1680 kva	1932 kva
	2000 kva	2240 kva	2576 kva
	2500 kva	2800 kva	3500 kva
	3750 kva	4200 kva	5250 kva
	5000 kva	5600 kva	7000 kva
	7500 kva	8400 kva	10500 kva

Permalex insulation now used in G-E medium transformers

General Electric now extends the use of Permalex insulation to medium transformers to give you 12 percent higher kva with continuous operation at 65C rise. You get this bonus kva at no price premium — and with no loss in transformer life expectancy.

For example — a G-E medium transformer with Permalex insulation, formerly rated by ASA at 5000 kva, 55C rise, can now be operated at 65C rise and 5600 kva with normal life. If you operate the transformer at ASA rating you get five times longer life. In addition, standard fan-cooled rating increments can be applied at 65C rise operation.

Your General Electric Sales Engineer has specific information on the savings you can realize with the new higher kva ratings — another Certified Full-value feature of General Electric medium transformers. Give him a call, or write for detailed information to Section 482-05A, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S VOL. 124, NO. 6 JUNE 1960

THE JOB AHEAD

The editors of Electrical West take a 15-year look into the future to examine the power requirements and energy resources of the region. Growth pattern for the 11 Western states provides the greatest challenge in public service ever faced by the electrical industry.

The forecast for 11 of the 13 Western states within the continental limits of the U. S. for the 15-year period of 1960-1975 should command serious study by every segment of the electrical industry in the West. The magnitude of the figures themselves is food for sober reflection but, more importantly, the problems, the economics and the resources available to meet future demands will compel serious study and some statesmanlike decisions to integrate increasingly complex relationships into the Western power system that will be needed 15 years hence.

In summary, the forecast reveals that by 1975 population of the region will have increased to nearly 40 million people—a growth of more than 50% in 15 years. Generating capacity to serve this population will total over 72 million kw as compared to 28 million kw today—an increase of 160%. Utility expenditures for new construction during this period will be a minimum of $23 billion.

In making this power resources study, the editors lay little claim to original research. Rather, this projection has been made from a base of solid statistical figures built up in the past by ELECTRICAL WEST and combined with the analyses of national, regional and special studies and reports (see bibliography). Thus the figures contained herein represent a composite of many recent projections of energy requirements weighed by the past performance of the industry and the judgment of the staff.

In this connection, the forecast was built up on a "three-area basis" but with the areas substantially different from those used in standard reporting by the Federal Power Commission. In the judgment of the staff, the three areas, as presented herein, each represent a more truly integrated power service area, all things considered, than do the Federal Power Commission regions which are primarily based on generating capacity. For example, in this study Area I comprises the States of California and Nevada, while in the FPC breakdown Region VIII comprises basically California, Nevada and Arizona. In this study Arizona was placed in Area II together with New Mexico, Colorado, Wyoming and Utah. This was done by reason of the fact that the development of the upper Colorado River plants of Flaming Gorge and Glen Canyon and the prospective developments of major thermal power in the Four Corners area together with the recently announced integration of transmission lines in that area (see ELECTRICAL WEST, December 1959,

TABLE I

	PAST			FUTURE	
	1950	1959 (12-31)	10-Yr Increase	1975	15-Yr Increase (1960-1975)
Population	19,641,000	26,250,000	**6,609,000**	39,021,000	**12,771,000**
Electric Customers					
Residential	5,056,696	7,656,974	**2,600,278**	12,000,000	**4,343,026**
Commercial	806,669	1,079,549	**272,880**	1,490,000	**410,451**
Industrial	54,907	77,676	**22,769**	126,000	**48,324**
Misc.	169,788	274,294	**104,506**	307,000	**32,706**
Total	6,088,060	9,088,493	**3,000,433**	13,923,000	**4,834,507**
Kwh Generated/Capita					
11 West. States	3,280	5,150	**87.5%**	9,290	**80%**
U. S.	2,960	4,100	**90%**	8,400	**105%**
Installed Capacity (kw)	12,064,300	28,839,000	**16,775,000**	72,100,000	**43,261,000**
Energy Gen.—kwh (000 omitted)	64,248,078	135,813,000	**112%**	362,000,000	**168%**
Const. Expense	**$7,600,000,000 (1950-1959)**			**$23,600,000,000 (1960-1975)**	

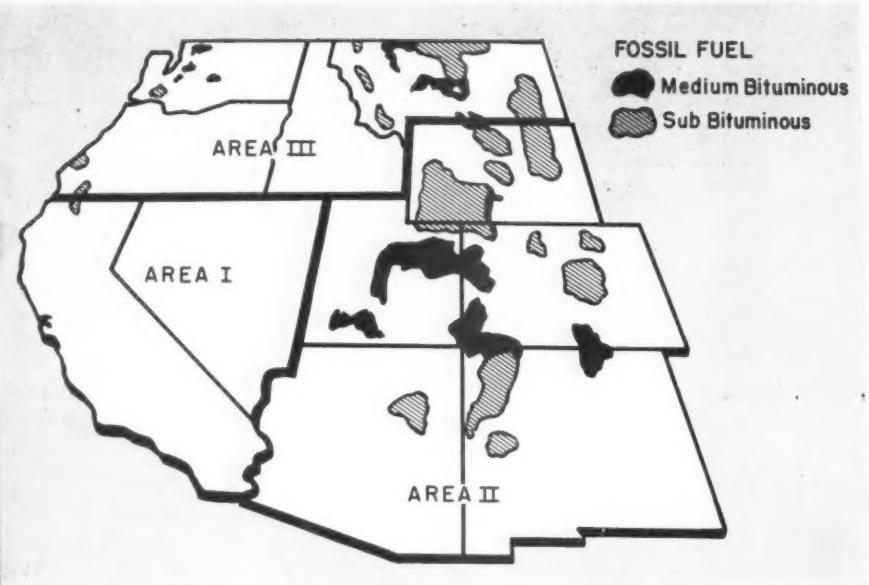


Fig. 1—View of the three power areas of the 11 Western states, showing location of coal deposits. Intermountain coals provide future low cost energy source varying from 15¢ to 24¢ per million Btu

p 59) all indicate that, in the future, Arizona's power problems will be more in common with the states of Area II than they would be with California and Nevada.

Likewise, in this study Utah was taken out of the FPC Region VII and placed in Area II. Utah is likely to become a pivotal state in Western power operations, primarily because, under the new transmission plan, the tie between the Northwest Power Pool and the Pacific Southwest will center in that state. Utah, likewise, lies adjacent to vast deposits of relatively low-cost coal which, by 1975, may be the source of the thermal power required both in the Pacific Northwest, the Intermountain and possibly the Pacific regions.

Area III, in this study, consists of the States of Oregon, Washington, Idaho and Montana, essentially the watershed of the Columbia and its tributaries within the continental United States.

Each area will be discussed individually hereafter. There are, however, some general conclusions that apply to the entire Western region which will provide a background for discussions of the individual areas.

Power Resources

The 43 million kw of new generating capacity that will be required by 1975 will pose a problem of energy resources for the region. With the exception of Area III, the Pacific Northwest, the bulk of this new capacity will have to be supplied from thermal plants. On the Columbia River system present, projected and potential hydroelectric sites will postpone serious consideration of thermal stations until the early '70s. Elsewhere in the West hydroelectric potential has become of insignificant proportions.

A breakdown of the probable future power sources by areas is shown on Table II. It will be noted that, in the next 15-year period, nuclear stations very probably will represent less than 10% of the total thermal power required for the region. Most of the nuclear stations will appear in Region I where high-cost gas and oil are the basic future energy sources. However, it should also be noted from Table III that, at 42¢ per million Btu gas and oil cost, bus bar energy from conventional thermal plants appears likely to be competitive with nuclear energy for a considerable portion of the period under study.

On the other hand, Rocky Mountain coal reserves (see Fig. 1) may provide still another hurdle for nuclear power. Estimates that coal supplies in the Utah-Wyoming basin will provide an energy source through 1975 at 19¢ per million Btu and a mouth-of-mine bus bar energy cost of 4.7 mills per kwh suggest that the combination of mouth-of-mine plants and extra high voltage transmission techniques possibly could provide competitive energy delivered as far away as the San Francisco Bay area. The fact that these coal supplies likewise are adjacent to lines of the Northwest Power Pool suggests that the thermal requirements for Area III arising in the early '70s might well be met from this source. The alternative, of course, would be either coal-fired stations utilizing fuel from deposits in the Puget Sound area or nuclear stations near the center of load density of the Pacific Northwest Power Pool along the Western slopes of the Cascades.

Area I

California and Nevada, comprising Area I, will enjoy by far the largest population growth in the next 15-year period. According to projections, fully 60% of the 13 million new people scheduled to appear in the West will show up in California.

This enormous population growth will require an even larger growth in power facilities, which are expected to jump from 12 million kw at the end of 1959 to nearly 30 million kw by 1975. As mentioned above, providing this extra capacity is complicated by the fact that Area I is a high-fuel-cost area (see Table III). Oil and gas are the two principal energy sources, with the latter being available both from Canada and from Texas. In providing the most economical sources of electrical energy in the future, the area's existing hydroelectric resources will play an important role as peaking capacity. One optimistic report predicts that, with units of 450-mw size, the bus bar cost of energy from conventional thermal units in 1980 would total 6.09 mills per kwh. To the extent that nuclear power techniques can be improved to meet this target will determine to a large extent the rapidity with which such plants are adopted. At the present writing truly competitive nuclear power stations probably won't appear before the late 1960s except in exceptional circumstances.

Authorities state that, at present costs, nuclear stations become truly competitive with fossil fuels when oil reaches $3 a barrel (equivalent to 50¢ per million Btu gas). Present prices for oil and gas are well below this figure. The advent of large supplies of gas from Canada in the San Francisco Bay area is likely to have the effect of providing a source of surplus steam plant fuel at a figure somewhat below 50¢ per million Btu for some years ahead. Oil prices, on the other hand, may continue to rise to the $3-per-barrel level by 1975. These figures indicate a highly com-

TABLE II — PRESENT AND PROJECTED GENERATING CAPACITY
BY AREA AND TYPE
(IN MEGAWATTS)

	1959			By 1975			
	Hydro*	Steam	Nuclear	Add Hydro	Add Steam	Add Nuclear	Total By 1975
Area I	4,310	7,700	10	2,500	13,100	2,200	**29,800**
Area II	1,500	3,000	...	1,200	12,100		**17,800**
Area III	9,900	500	...	11,500†	2,100	510	**24,500**
Total Areas I, II, III	15,710	11,200	10	15,200	27,300	2,700	**72,100**

* Installed capacity
† Approximately 4,000,000 kw by investor-owned companies

petitive atmosphere for atomic stations will prevail possibly well into the '70s.

Oil as a fuel, in addition to its cost, is not appealing in the smog-prone metropolitan areas of California. Potential coal sources for Area I are located in the Utah-Wyoming area—some 600-700 miles away from the California coastal areas. But reference to Table III indicates that fuel costs there, coupled with large, base-loaded steam generators, offer bus bar energy for under five mills.

Viewing Area I as a region suggests a solution to a problem that has killed coal as an energy source when viewed by a single utility system. The requirement for a large plant to achieve favorable plant efficiency and extra-high voltage to achieve transmission efficiency have dictated that far too many lines be built to obtain the required degree of reliability and far too much capacity to be remotely located compared with any one system's capability. However, the area concept gives the strong inference that joint venture generation and transmission undertakings would make possible both the efficiency of giant plants and the reliability of several lines without heavy financial or service penalties to any one system.

There is a resurgence of the study of EHV transmission phenomenon under way. Already, the price of EHV station components is radically reduced. Near to the heart of the issue is the fact that tower line costs, which will make or break long distance transmission, have not received the attention that has been given to nearly every other component of the utility plant. European tower design has been shunned by American companies, presumedly because they are steel poor.

With present studies under way at the 660-kv and 750-kv transmission levels, it is not logical to suppose that transmission costs of 2 mills per kwh over these distances is attainable in the future? If so, then Rocky Mountain coals become competitive with reactor-powered and gas-fired thermal stations in Area I.

Perhaps the largest single benefit from such an undertaking would be political. The recent proposal of the New York State supergrid, the eagerness for federal power advocates to jump into the Bonneville-California tie and recent pronouncements of the American Public Power Assn. would appear to be sufficient documentation that the idea of a federal power grid is not dead and will be pushed in the absence of existing regional interconnections.

Thus, out of analysis of the industry's own figures on the energy supply situation of 1975, comes the implication that the industry might consider the economics and benefits of linking West Coast loads with Rocky Mountain coal reserves through the means of extra-high-voltage transmission without undue economic indigestion.

Despite political discussions concerning the economic benefits of a major extra high voltage grid covering both the region and the nation, the fact remains that what little surplus hydro energy may be available in the next 15 years would be minute compared to the total energy requirements of any area. In other words, each of the three areas must be looked upon as being wholly self-sufficient with respect to its area power supply even though it may have to reach out beyond its own boundaries for energy sources such as would be the case of utilization of Utah coal in California.

Area II

The southern tier of states straddling the Continental Divide comprises Area II, which is slated for a 46% growth in population but something less than 2½ million persons in number. However, predictions by the public utilities in this

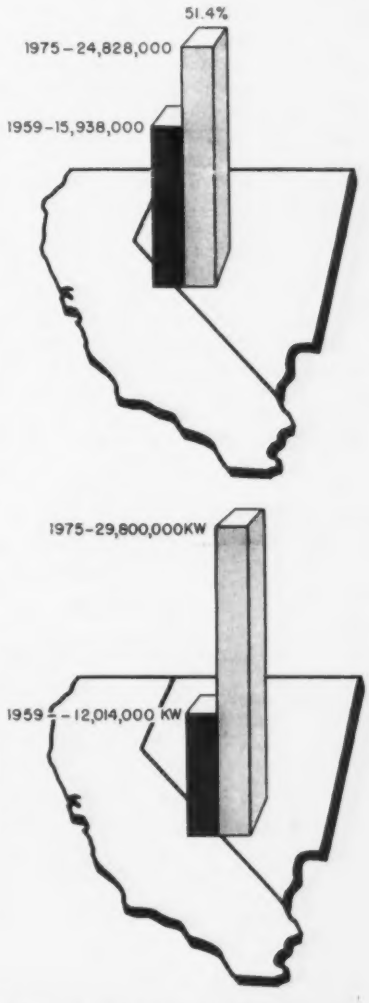


Fig. 2—Power Area I showing (top) projected population growth and (bottom) projected generation requirements

TABLE III
PREDICTED FUEL AND ENERGY COSTS 1975

	Fuel Cost $/Million Btu	Bus Bar Cost Mill/Kwh*
Western Area I	42	7.15
Western Area II	24	6.50
Western Area III	19†	4.70

* Best prediction for competitive nuclear plant: 7.1 mill/kwh by 1965 (See Electrical West, March 1960, p 83, report by AEC's Frank Pittman)
† Utah-Wyoming prices 1970

region (see December 1959 ELECTRICAL WEST, p 59) indicate a growth in electrical capacity of some 300% in the next 15 years. Generating capacity will have to increase from its existing 41½ million kw to nearly 18 million kw by 1975. Present plans also call for a well-integrated area transmission grid linking the two major hydro stations on the upper Colorado River with the Four Corners fuel basin. Utah Power & Light, the major system in that state, is already strongly linked with the Northwest Power Pool.

Over 90% of the additional capacity requirements will be of a thermal type. Fortunately the region is rich in coal resources that vary in price from 24¢ per million Btu in the Colorado area to 15¢ per million Btu in the Utah-Wyoming area. As it will probably be 1975 before individual systems in this area can absorb units as large as 250 mw, the over-all bus bar cost of energy is relatively high. However, the abundance of fossil fuel is likely to defer the adoption of any nuclear stations well beyond the period of this survey.

Area III

The Pacific Northwest, Area III, is unique in the United States in that practically all of its future power requirements for the next 15 years can be met with hydroelectric developments in the Columbia River watershed. It will be early in 1970 before the first new steam plant will be required in this area and, depending on the economics at that time, it is difficult to determine whether coal, gas or atomic piles will be the favorite source of heat. It is probable, however, that two or three nuclear stations likely will appear on the Western end of the well-integrated transmission network that extends from Utah and Montana to Pacific Northwest load centers.

The area also lies adjacent to Canada where extensive hydroelectric developments are contemplated or under way. These not only provide a possible source of temporary firm power for import, but likewise will have a substantial effect on improving the flow characteristics of the main steam of the Columbia with the consequent advantages of improving the storage use and firming up power from existing plants.

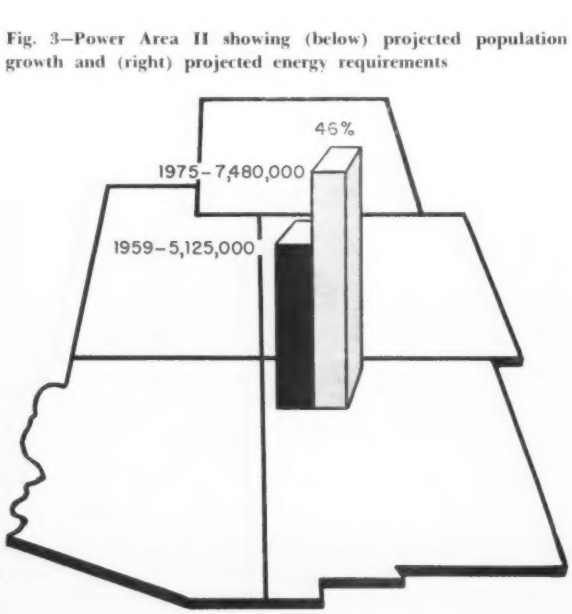
While the projected population increase is the lowest of the three areas, being only 25% and representing barely 1½ million people, the benefits of low cost hydroelectric energy are expected to project capacity requirements from approximately 10 million kw today to more than 24 million kw in 1975.

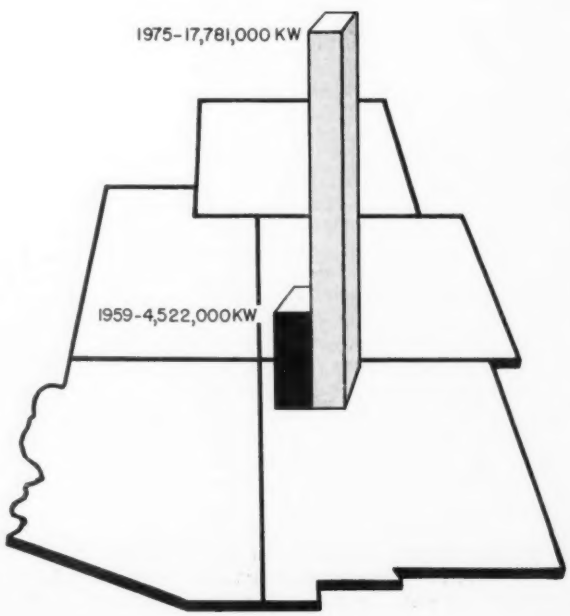
Such surplus power as is now available on the Columbia might be considered temporary in nature and will essentially disappear as load growth exceeds the firm power capabilities of the main river. Sometime before 1970 the Columbia will become a fully regulated series of pools extending from the Grand Coulee reservoir on the Canadian border to the discharge at the Bonneville plant.

System Output

Reference to Table I indicates that the projected total customers in the 11 Western states in 1975 will total 13,923,000, an increase over the beginning of 1960 of 4,834,507. At that time, the average send-out per capita in the West is expected to be 9,290 kwh per year, requiring a total generation of 362 billion kwh. In 1959 the preliminary figures indicate that the kilowatt-hours generated per capita were 5,150 in the 11 Western states as compared to 4,100 in the U. S. as a whole. By 1975 more

Fig. 3—Power Area II showing (below) projected population growth and (right) projected energy requirements





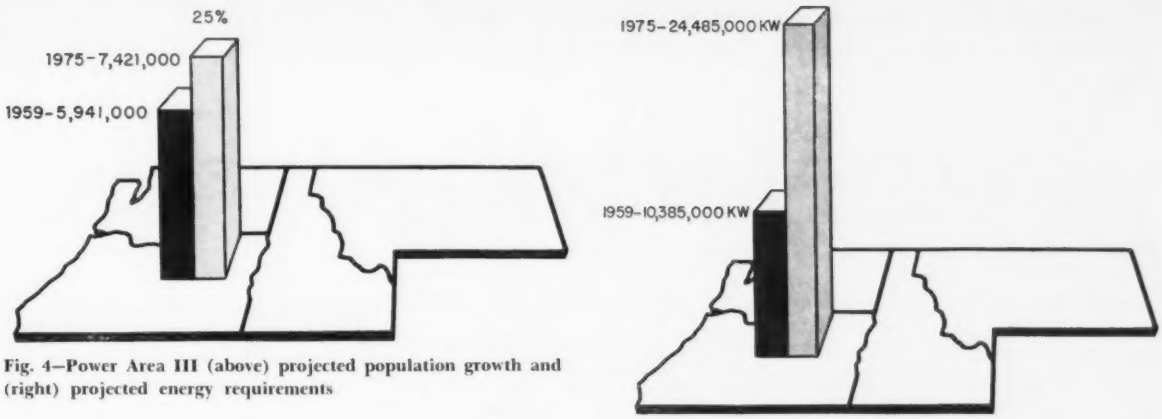


Fig. 4—Power Area III (above) projected population growth and (right) projected energy requirements

than 50% of the send-out will come from thermal plants as compared to 39.7% today.

Transmission and Distribution

During the decade just past, statistics reveal that the electric systems of the West added 1.8 miles of transmission line for every megawatt of generating capacity installed. Likewise, 4.5 miles of distribution lines were required for each megawatt of new generating capacity.

Using another yardstick, during the past decade for each thousand new customers added to the Western systems, utilities provided 8.5 miles of transmission lines and 21 miles of distribution circuits.

Because of the dominance that thermal plants will have in the future, it is difficult to evaluate future transmission requirements based on past performance. ELECTRICAL WEST is predicting that transmission requirements for the 15 years will total 1.2 miles of circuits per megawatt of new capacity added for a total of just over 56,000 miles.

In the distribution category, if past ratios hold true, a minimum of 105,000 miles of new distribution circuits will be required. It is obvious that moving the projected massive amounts of power to markets will involve substantial increases in the size, number and complexity of transmission and distribution circuits.

Costs

During the past decade electric utility organizations in the 11 Western states invested just over $7½ billion in new plant and related facilities. Thus the over-all investment per kilowatt of new generating capacity added totaled $511. Similarly the system investment per new customer added during this period totaled a whopping $2,800.

By applying these figures to the projected growth in physical plant and factoring in indices of increased cost during the past decade, a minimum investment of $23.6 billion will be required in the next 15 years to meet the electrical requirements of the region. By 1975 annual electric utility investment is expected to be at the rate of $2 billion. This is almost exactly double the spending rate during 1959 and 1960.

Conclusions

If it is true that the past is the prologue to the future, then the prospects for the West are very promising. But as impressive as these predictions may appear, they are probably the most conservative of any of similar studies on record. In any event, the editors have pledged themselves to report annually these predictions against actual accomplishments in the annual statistical issue of the publication. If a reasonably close relationship exists between the two in the future, then the job ahead is a challenging one for every member of the industry.

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Ray Cayot Wins Electrical West Kilowatt-Hour Contest

Ray's guesstimation of 135,887,353,000 kwh for the 11 Western states came surprisingly close to the actual of 135,887,055,000 kwh. In this picture Ray, left, becomes convinced that EWEST Editor Jack Robinson is not pulling his leg. The $500 prize will be in the form of common stock in Tucson Gas, Electric Light & Power Co.—the result of a drawing from among Western utilities. Ray is senior civil engineer with Pacific Gas and Electric Co., father of five daughters. He says the stock will help educate his girls.

A Panorama of 14 Electrical Industry Meetings. Electrical West's Editors Report . . .

PROGRESS THROUGH ASSOCIATIONS

Almost like the knight in one of Stephen Leacock's parodies who "rode madly off in all directions," the editors of Electrical West spread over the entire West these past two months. There were more than 14 conventions, conferences or meetings to track down and from which report to readers the distilled essence of what's brewing in the industry out West.

What if it totaled half way around the world, stretched expense accounts and banquet stomachs, the news must come through, fire, flood or airline reservation tangles and saddle sores to the contrary. And here it is.

Sorted, sifted, digested and interpreted, the significant talks, thoughts, ideas and opportunities from the 14 plus are offered this year as a panorama of basic forces in the industry rather than as a report meeting by meeting.

It is from such key ideas that progress is built through association.

What's Going on in Management

Storm warnings were flown by most of the speakers at recent industry conventions in the West concerning the future of the democratic system and the free enterprise philosophy. Some bluntly asserted that we were far down the road toward socialism; others, by analysis, pointed out the trends that left no doubt which way we were headed; all were unanimous that businessmen generally had been woefully lacking in asserting leadership in the political area from which emanates most of the legislation that fosters inflation, undermines the financial structure and destroys initiative.

At the PCEA's 43d annual convention, held at the Stardust Hotel in Las Vegas last month, these trends were underscored by a program built around the theme "Stakeholders – Speak Out." Keynoting the convention, Sherman R. Knapp, president of the Connecticut Light & Power Co., told the assemblage that the electric power business must speak out to increase its national stature and public understanding. He pointed out that each electric company in its own community enjoys great prestige but that public appreciation of the electric power industry as a whole is less than the sum of its parts. He asserted that much of the public confusion about the power issue was due to utilities themselves who have failed, in many cases, even to make their own customers know whether they are served by taxpaying electric power companies or by government-supported power operations. He cited the splendid record of the investor-owned power companies in providing good service at low cost in face of unfair government power competition and urged that utilities speak louder locally to be heard nationally. He suggested that the support of such programs as ACTION Inc., a privately financed service organization to improve urban-depressed areas, is one of the ways that the leadership and interest in public service of the power companies can be forcefully brought to the attention of the general public.

Edwin Vennard, managing director of Edison Electric Institute, told the convention that the business leader holds one of the key positions in modern society and the daily decisions that these leaders make shape our economy and influence the lives and the livelihoods of all of us. He, too, pointed out that knowledge by both the employees and the general public is necessary to understand how the business system operates for the benefit of all and that the science of relations with the public and employees is the greatest challenge facing management today.

The socialistic trends that confront the country today are basically due to economic ignorance. This is a challenge to management to set about eradicating the areas of economic ignorance that can be found and measured through modern survey techniques. "It's not enough for the company to be a good company," he said, "but ways and means must be devised to tell employees, the public and investors that the company is good."

EEI Courses

To help in this economic education, Edison Electric Institute is bringing out four courses, two of which are already available. The first course informs employees on the fundamental facts about America and the American economic system. The second is about American freedom and the ways which can be kept or lost. The third course deals with the fundamentals of the electric utility business and the fourth with the problem of government operations in the power business. Utilizing these courses with employees can be the first step in establishing better communications and a better understanding of the American philosophy of abundance.

Also accentuating the need for better communications with employees and the public was the talk by Walter G. Barlow, president of Opinion Research Corp. He stated that businessmen, in vast numbers, have been lax in exercising the re-

Sherman R. Knapp, president of the Connecticut Light & Power Co., addressing the opening luncheon of the 43d annual convention of the Pacific Coast Electrical Assn. at Las Vegas, Nev. The board of directors of the association is at the head table

sponsibility of working for good government. He cited case after case that indicated (1) that businessmen have been lax in exercising influence on legislators; (2) the public looks with favor on the idea of businessmen in the areas of political leadership. In fact, the public has a much higher regard for business leaders than it does for union leaders. Even among manufacturing workers, the businessman is accorded a highly favorable public image.

However, the surveys also show that the businessman will be a far more effective spokesman as a private citizen rather than attempting to capitalize on the power of prestige that might be associated with his company. Thus it appears the role of the company in politics should remain nonpartisan and be primarily educational or informational. The individual employee, however, should be encouraged to participate in partisan party activities to insure that business ideas get a fair hearing from the electorate.

Dr. E. M. Gherman, president of Incandescent Supply Co. of Los Angeles, demonstrated to the convention just how difficult it is to carry out an effective communications program both between individuals and within a company's organization. People, according to Dr. Gherman, are very mediocre listeners and observers. For example, the average length of time that a speaker can hold the attention of a listener is about two minutes. The listener's attention drifts away and then comes back to what the speaker is saying—thus losing the trend of thought and bringing about a conclusion in the listener's mind that may be not at all what the speaker was trying to say. His remarks served to emphasize the importance of developing good techniques as well as instituting a program of internal communications within organizations and groups that can accomplish some of the objectives mentioned by previous speakers.

External Threats

While the electric utility industry may be in the forefront in the battle against socialism within this country, several speakers on the PCEA program spelled out the over-all military and economic threat that is imposed by policies of the Soviet. Dr. Nicholas Nyaradi, former Minister of Finance of Hungary, gave the convention a sobering first-hand report on the workings of the Soviet hierarchy. He emphasized that the continuation of the cold war is a manifestation of the conviction that the present trends toward socialism in this country will continue until its economy collapses, at which time the Russians will have won. He urged a strong educational program to convince the people of this country of the real values of freedom and the urgent need to preserve the system that has brought abundance to all. Dr. Nyaradi pointed out that labor domination, no matter how benevolent initially, ultimately will lead to socialization of our institutions and the destruction of the economy of the country. He also pointed out that labor remains free only as long as management is free and predicted that disaster will inevitably result if free enterprise is ever replaced by a labor-dominated government.

Gen. Robert L. Scott, U. S. Air Force, Retired, and author of *God is My Co-Pilot*, asserted that, current Pentagon talk to the contrary, the only effective retaliatory striking force that the United States possesses today is the Strategic Air Command and that manned aircraft will have to be our major shield until we can catch up with the Russians in missiles and rocketry. Both he and Dr. Nyaradi asserted that the only argument the Russians understand is force and the threat of immediate and devastating retaliation. He warned that any moment that the Russians feel they can strike this country without heavy retaliation

Meetings Covered

—PCEA—Annual Convention, Las Vegas
—Administrative Services, Pasadena
—Engineering & Operating, Berkeley
—NELPA—Engineering & Operation, Missoula
—Business Development, Yakima
—RMEL—Spring Conference, Boulder
—NECA—District 5, Phoenix
—Districts 6, 8, 9, Seattle
—IES—Intermountain, Scottsdale
—South Pacific, Hollywood
—Pacific Northwest, Seattle
—NWPPA—Engineering & Operating, Port Angeles
—IAEI—Utah, Idaho Chapters

Newest and oldest PCEA presidents at the convention. Left—C. A. Wikle, president, Schulman Electric Co., Los Angeles, this year's PCEA president; Victor Hartley, managing director, PCEA; and A. B. West, who is retired from the California Electric Power Co. and was president of PCEA in 1921

Walter Maytham, regional vice-president of the Westinghouse Electric Corp. (left) and Walter Barlow, president of the Opinion Research Corp., talk with W. C. Skousen, law enforcement administrator of Salt Lake City, who told the PCEA convention about the communist threat

they will do so. Adequate funds for defense must be made available, he continued, and concluded that our hope for the future lies in the assurance of our military leaders that our defenses are adequate. "If their appraisals are wrong," he stated, "we are well on the way to becoming the most comfortable, the most traditional and the richest nation in the cemetery."

Robert R. Gros, PG and E's vice-president in charge of advertising and public relations, brought the convention up to date on the summit crisis which occurred during the meeting. Based on his acquaintanceship with both the Russian and U. S. leaders and on his friendships in Washington, which permitted him to obtain up-to-the-minute information, he reported that some high-level Washington leaders feel that the summit breakdown would have occurred without the plane incident because Khrushchev may be having internal troubles in Russia and could not permit the visit of the United States president. He, too, predicted that the Russians would have no compunction about starting an atomic war if they thought they could win but he felt that the summit incident would result in an intensification of the economic battle rather than an all-out holocaust.

Bright Prospects

Despite the existence of forces that threaten the American way of life and our country's very existence, prospects are bright for business prosperity during the '60s, according to George C. Tenney, president of the McGraw-Hill Co. of California and vice-president and director of the McGraw-Hill Publishing Co. He predicted increasing capital spending to build America's productive capacity and showed by the use of charts and tables how prosperity followed capital expenditures. The economy will expand 47% between 1960 and 1970, by which time the gross national product will reach $748 billion annually. The rapid growth of research and development expenditures will have resulted, by 1970, in almost one-third of the manufacturing sales of the country being in products that are not available today. As a measure of the vitality of the free enterprise system and its economy of abundance, Tenney predicted that the average family income will go up from $5,000 in 1960 to $6,450 in 1970, measured in noninflated dollars and that, because the American productive system has virtually eliminated the problem of scarcity, a strong brake will be placed on the inflationary spiral that has been in existence postwar.

If the country would spend about half of what it spends on tobacco, it could enjoy the educational institutions that will be required in the forthcoming decade of abundance and prosperity. This statement was included in the remarks of Frank H. Sparks, president, Council for Financial Aid to Education, who told the convention of the tremendous load that will be placed upon our institutions of learning in the forthcoming years. These institu-

Snapped at the annual banquet were Mr. and Mrs. Ralph Mitchell of Central Transformer Co. (left) and Mr. and Mrs. Robert Gerdes of the Pacific Gas and Electric Co.

tions will need at least $2 billion per year in voluntary contributions by 1970. Part of the increasing cost of providing higher education facilities must be borne, as it is now, by voluntary contributions from business, and Sparks urged that each corporation revise its program to meet the responsibilities and obligations involved in giving the rapidly growing group of college-age youngsters the opportunity they deserve. Public utilities, he said, are not among the upper half of companies who donate regularly a small portion of their gross income to educational institutions of their choice.

PCEA's new president Harry W. "Pop" Hartzell, who is chairman of the board of Maydwell & Hartzell Inc., San Francisco

Internal Problems

John Mead, vice-president, Southern California Edison Co., speaking before the NELPA Business Development Section, described his company's division and district rating system that was devised to give a better evaluation of utility sales effort. The establishment of sales quotas leaves something to be desired unless other factors pertaining to differences between divisions and districts are worked into the evaluation system. In the rapid growth that is being experienced in most areas of the West, the quota system can be misleading in that saturation of various residential appliances can go down even though a high unit sale is achieved.

The evaluation system automatically adjusts for and is based on the variation in opportunities for sales that may exist in each area and thus measures performance on a more realistic basis as well as providing a more accurate comparison of accomplishments between the various districts and divisions. On the Edison system 11 components are included in the over-all evaluation, with each component being assigned a weighted value. For example, one component, ranges installed in new and rewired homes, is computed by adding the total ranges installed during the period and then comparing this with the number of new homes completed.

One result of this new evaluation system has been to encourage field sales forces to think in terms of the over-all job rather than any particular segment of it.

Management Sales Conference

In a session designed primarily for supervisory and management personnel, with attendance limited to those designated by their companies, NELPA's Business Development Section considered effective sales organization and questions associated with promotion expenditure and effect of peak loads on sales activity.

Although questions were admittedly loaded in a panel led by Gordon DeFoe, WWP, and centering around the theme: "How much should sales departments spend per dollar of increased revenue," they sent delegates home with something to think about.

On the main question itself—promotional expenditure per dollar of gross revenue—Idaho Power Co.'s Al Gilbert was most explicit. His company is willing now to spend 40¢ out of each dollar of new business revenue for promotion and advertising, including area development and pay roll, which is a big item since Idaho Power believes in keeping a large sales force. Today's spending is less proportionately than it was earlier because, although the sales department is larger, gross revenue is higher.

Opinion varied greatly on the question: "How much of our annual gross revenue is due to sales effort?" One company's figure of 23% of commercial and 10.5% of residential was considered by the others to be much too low, particularly in the residential category. The same question applied to utility advertising found the panel unwilling to set a figure but convinced of value.

Questions thrown out for future thinking: Are EAR figures an accurate report on increased revenues? Has anything been done to substantiate them in the last few years? Should we look outside the company for campaign support? If incentive pay is offered, should all employees participate or just the sales staff? Is there a point on the saturation curve where it is uneconomical to spend promotional dollars? How much should be spent to support national programs? Are short campaigns more effective? Can a utility afford to give premiums that will gross annually their cost?

Considering the question: "Should peak load business be priced to reflect the cost of such service and what is that cost," a panel led by Otto Zwanzig, BCE, represented both the conservative and liberal view. Opinions ranged from the comment of R. G. Scott, BCE: "Price realistically; there is no future in selling service at a loss," to the "obligation to serve" theory of Leo Chaffin, PGE, who finds concern about individual appliances over magnified. Growth is the one overriding consideration

N. W. Plath of the Sierra Pacific Power Co., Reno (left), Mrs. Ruth Johnson, Mrs. Plath and Dana Johnson, regional manager for Sangamo Electric Co.

This group of PCEA speakers on communication and education includes (from left to right): Frank H. Sparks, president of the Council for Financial Aid to Education of New York; Edwin Vennard, vice-president and managing director of EEI; John H. Mead, vice-president of Southern California Edison Co.; and Dr. E. M. Gherman, president, Incandescent Supply Co., Los Angeles

in sales activities, he said. Growth kept at relatively the same price levels gives stockholders promise and sales departments something to do.

A comprehensive picture of a general sales organization was given by Al Gilbert, Idaho Power, and members of his staff. Concluding the session with "An approach to sales department organization," Howard Arnett, PGE, urged a basic approach to utility problems; knowing why we are in business and what we want to achieve. Since markets aren't creative, but must be created, sales functions have emerged as the primary tool for motivating the economy as a whole as well as the utility business, he said, and are no longer to be thought of as parasitical.

The management conference interrupted its deliberations long enough to pass a resolution endorsing the High Mountain Sheep development for which Pacific Northwest Power Co. has a license application pending before FPC.

Computing Unit Costs

Several important subjects pertaining to management were covered in the Administrative Services Section meeting of the Pacific Coast Electrical Assn. E. C. Ritchie, assistant manager of the evaluation department of PG and E, made an able presentation of the capabilities and limitations of computing unit costs for various management purposes. He pointed out that the purpose for which unit costs are being developed is an important factor in the choice of methods used in compiling them. He also indicated that the compilation of any unit cost cannot be considered as an exact science but rather as a work which reflects the education, experience and motivation of the person in direct charge.

At the same meeting William M. Mariott of the Southern California Edison Co. pointed out that higher money costs is one of the factors that can seriously affect the return on equity capital and its effect should be pointed out to commissions when asking for relief from inadequate rate schedules. By a series of examples he showed how the increase in the cost of money affects both the over-all rate of return and the amount available for dividends on the common.

Harry P. Letton Jr. of the legal department of the Southern California Gas Co. outlined procedures in placing cases before regulatory commissions. In addition to the legal and mechanical procedures involved, he suggested that the public relations department of a utility should be brought into the case well in advance of the filing date. This permits educational programs for key employees or the general public to be worked out prior to the time the case comes in for public hearing. The PR department also can be useful in preparing publicity in connection with the progress of the case.

Lettow also suggested that, after a case had been fully outlined, witnesses should be selected as early as possible and each of the basic facts contained in the outline should be assigned to one or more of the witnesses for ultimate proof. Experience has shown that the best witness is one who has been in on the preparation of the case from the start and has participated in the preparation of material to be presented. In this connection it is necessary to actually train men in the art of being a witness and a fairly representative pool of capable men should be one of management's objectives. Some of the cardinal points in being a witness include a determination not to argue with opposing counsel on the witness stand, not to become irritated or angry while on the stand and to frankly admit ignorance if a question is posed beyond the witness's knowledge or ability.

Contractors Appraise Practices

Somewhat reluctant, the electrical contractors attending both the District 5 at Phoenix and the Tri-District 6, 8 and 9 at Seattle took a taste of NECA's new management self-appraisal course. On the whole the self-revelations, even for so small a part of their management responsibilities as that of marketing, created a desire for the full treatment now offered. It is one of a group of management courses now offered by means of the workshop method.

The self-appraisal workshop, in which all attending the two conventions were made to participate, was conducted by staff members Dr. Charles D. Phillips, James B. Murphy and John Sullivan of NECA's Research & Education Department, Washington.

Many chapters throughout the country are signing up for the conduct of similar workshops on management problems at the local level.

"Management's Rights and Responsibility to Manage," by A. R. Woolley, manager, Intermountain Chapter, penetrated below the surface of management chores to the fundamentals relating management to the success or failure of the private enterprise system in America. Though ranking high in technology, he pointed out, contractors still are in a sick industry "on the threshold of profitless existence."

As members of a multi-employer group, contractors have elected to relinquish control of certain rights in recognition of humanitarian principles for the benefit of employees. Because of this, he said, they should deal with all employees as a unit and not as individuals.

However, although rising wages must be recognized in the present economy, he pointed out that wages are not the real issue. "Far more important to the costs involved in our business is the sacrifice of other more important prerogatives of management." He then cited a number of rules and fringe benefits which have been negotiated away from management's control and which put the contractor at a disadvantage in selling his services. "If the losses

to productivity caused by these featherbedding practices could be evaluated it might well equal or exceed the rate per hour paid to the men," he said.

Management's chief responsibility is the duty to conduct a profitable business. Business for profit, he said, is the very cornerstone of our economic system. It is management's responsibility to control costs before profit can accrue. "Our efforts at cost control are seemingly centered on two things: the rate we pay labor and the price we pay our suppliers. We have no control over either, and the time we spend on these factors is time wasted."

Exaggerated hopes centered on legislation, likewise, he considered a waste of time because the results do not and cannot ever meet anticipations. Further, he warned, that if many gained the type of laws that they seemingly want they would replace the present form of government with still more collectivism. The power of decision would be removed from the individual and placed with the state, where decisions would be made for them. "This is a dangerous power to vest in any man or group of men, in any government, and the inevitable consequence of such power is corruption; the more absolute the power becomes, the more complete will the corruption be that results."

Engineers and operating men, too, are concerned with the philosophy of management and with organization principles and standards.

Speaking at the E&O Workshop of the Northwest Public Power Assn., Howard C. Elmore, Chelan County PUD, pointed out that PUDs that had started operation by acquiring private utility properties sometimes "had considerable difficulty reaching organization stability" through continuing personnel who "were a fragment of a former centralized private utility organization and were not accustomed or trained to take responsibility and make the decisions required in a completely autonomous operation."

PUDs need a better understanding and wider practice of organization principles and standards, Elmore declared. Supervisory training programs were cited as a prime need and could be a joint effort of the PUDs, he said.

Local public power organizations have become "less provincial" because of their mutual associations and sharing of common problems, a trend which Elmore believes will continue, even beyond such areas as joint training programs.

Left to right—Gen. Robert L. Scott Jr., USAF, Ret., who talked on "Air Supremacy in the Space Age"; C. C. "Larry" Walker, regional vice-president of General Electric, who presided; W. L. Chadwick, vice-president, Southern California Edison Co., who spoke on future energy resources; and George C. Tenney, president of the McGraw-Hill Co. of California, who charted the economic pattern of the '60s

People, Procedures and Philosophies

Dr. Frank M. duMas, professor of psychology at Montana State University, addressed the NELPA E & O group on the intriguing subject of "S = P1 + P2 + P3." Explaining the symbol, Dr. duMas pointed out that S equals success, P1 is people, P2 is procedures and P3 is the philosophy of management. Turning his particular attention to the P3 segment of the success formula, Dr. duMas compared the typical military or authoritarian philosophy of management with the scientific philosophy of management, which is growing in popularity in American business. The authoritarian philosophy was based on the simple assumption that the boss is better than the subordinates, whereas the scientific philosophy is based on the notion that every man in the organization "stands tall." Comparing the two systems in operation it became very clear that the authoritarian philosophy engendered many of the recognized ills such as the deadly grapevine. With the scientific philosophy, motivation becomes positive and satisfying to the individual both socially and psychologically, Dr. duMas pointed out.

. . . in Rate Engineering

Load characteristics and underground services to commercial markets and housing developments were of primary concern to rate men who met with NELPA's Business Development Section at Yakima.

Faced with a public that has become pole conscious through plans for Seattle's Century 21 Exposition, Puget Sound Power & Light Co. has put a good deal of study on underground service for both commercial and residential development. Of special interest, therefore, was Leo Aaltonen's paper on advantages and problems of selling UG services.

Assuming that the company might justifiably invest in underground at the same ratio to gross revenue as used for overhead facilities, a 1.5 to 1 ratio was set up. It was found that, applying this ratio to the two shopping squares already constructed, the company could purchase all the primary underground facilities, including cables, switches, control equipment. The analysis also indicated that the primary electrical system in a modern underground system represents about 50% of the cost of the total system installed.

Therefore the following policy is being considered for shopping squares and similar developments: (1) developer must install the complete UG system to Puget's specifications; (2) Puget must be granted satisfactory operating rights, enabling it to take over ownership of the primary electrical system; (3) the company will pay the developer 50% of the installed cost of the overall UG system; (4) the developer will own, operate and maintain vaults, tunnels and duct system and also the secondary leads to consumer premises; (5) Puget will own, operate and maintain the primary electrical system and the meters and transformers.

This policy if adopted would give Puget control of the entire underground system at a plant investment figure consistent with that of its commercial business generally.

Rocky Mountain Electrical League members inspect power plant model at conference

...in Engineering & Operating

Far and away the most important single impression to be gained from the Western Engineering & Operating conferences was the great number of presentations which hinged on new applications and uses of computing devices. The topics presented and their authors are reproduced in the box on this page—a testimony to the vitality of Western utility engineers. We commend them highly. More interesting than the number and breadth of subject matter is the fact that many of the papers were presented by men whose technical schooling had no knowledge or mention of the capabilities of today's computers. Interesting also is the fact that most of the devices under discussion were not available five years ago. For any who feel that utility engineering is a sinecure bordering on the stodgy, these papers will serve as a sharp rebuttal.

Power Generation

In the area of power generation, W. L. Chadwick, Southern California Edison, discussing future energy resources, said, "the history of energy conversion has been one of search for better and better materials."

"At present, economic fossil fuel conversion is on a plateau until better materials are available. The critical need for better materials affects the practicability of every new process."

He described the future potentials for electrical energy production of water power, fossil fuel conversion processes, nuclear processes and direct conversion processes.

He pointed out that none of the direct conversion schemes is based on a new concept.

Thomas Seebeck discovered the basic phenomenon upon which thermoelectricity is based in 1821; the principle behind thermionic generation was discovered in 1887 and described by Thomas Edison in 1884 at the first meeting of the American Institute of Electrical Engineers; magnetohydrodynamics was discovered 130 years ago by Michael Farraday; and the fuel cell principle dates back to Sir William Grove in 1839.

"Certainly at no time in the history of mankind," Chadwick said, "has there been so much high quality talent directed to so many different schemes for energy production as at present. Without doubt, these efforts will be rewarded by findings of new devices and new processes, but all will depend upon the development of new materials for high temperature use."

Southern California Edison Co.'s Jack Moore and T. Hudson of the Daystrom Systems Co. discussed (see box) special purpose computers for power plant automation. Another computer-oriented paper was delivered by Bruce Bell of Southern California Edison regarding a combined boiler turbine condenser ASME test. In the paper, the testing of Huntington Beach steam station No. 1 was described with particular reference to the detailed calculations that were performed by a program developed for the IBM 704.

Another topic of considerable interest was the paper by N. L. Scherrer and M. L. Rager, Pacific Gas and

The Part Computers Play in Power Engineering

Application of Computer to Northwest Power Pool Load and Resources Analyses, E. F. Timme, Coordinating Engineer, Northwest Power Pool.

Computing with SADSAC, J. F. Fuller, General Electric Co., Denver.

Transmission Tower Spotting by Digital Computer, Vincent Converti, Arizona Public Service Co.

Solid State Computer for Power Plant Automation, T. Hudson, Daystrom Systems Co.

Automated Control of Huntington Beach Units, J. B. Moore, Southern California Edison Co.

Digital Computer Studies of Overhead and Network Distribution Feeders, R. F. Donovan, Public Service Co. of Colorado.

Digital Computer Program for Determining Economic Voltage Control of Primary Feeders, H. S. Shott, Westinghouse Electric Corp.

New System Planning Techniques Promise Reduced Investment and Operating Costs, E. W. Moriss, Westinghouse.

Evaluation and Control of Distribution Circuit Interruptions by Machine Recording, M. R. Mosquini and J. A. Lighthipe, Southern California Edison Co.

Application of a Small Purpose Digital Computer to System Operation and Engineering Design Problems, A. J. Mischnick, California Electric Power.

Digital Solutions of Short Circuits for Determining Relay Settings With the IBM 704 Computer, J. B. Dingler, Southern California Edison.

Plant Performance on a Digital Computer, Vincent Converti, Arizona Public Service.

Computer Analysis of Feeder Regulator Operation and Practical Benefits of Closer Voltage Regulation, M. W. Gangel and E. J. Wejman, General Electric Co.

Application of Electrical Computer to Transmission Design, M. L. Brown, Southern California Edison.

Electric Co., covering the economics of shutting down 100-mw or larger units as compared with operating with minimum loads.

Shut Down Brings Savings

The results of comparing both methods show that shutting down units when not needed for spinning reserve can save as much as $1,200 per day over minimum load operation. The maintenance procedures necessary for protecting outdoor power stations were treated in two areas. G. E. Allen and R. F. Hawes of Pacific Gas and Electric discussed the maintenance and operating problems relating to outdoor stations based on experience at their Pittsburg and Humboldt Bay power plants. From still another viewpoint, Fred S. Watts Jr., Public Service Co. of Colorado, discussed the problems and techniques for winterizing outdoor power stations in areas where the ambient may be a −10 F and startup would be impossible without external heating of piping and valves. In the field of hydrogenerating John Bussi and Jess Herrera of PG and E discussed trends in the protection of hydrogeneration plants. They stressed the importance of evaluating the protective scheme of each installation in an effort to obtain the optimum balance between reliable protection and economy.

On the subject of far-out methods of energy generation, Westinghouse Electric's D. J. Povejsill and A. W. Moody, General Electrirc Co., discussed the fuel cell and other new devices. Both speakers adopted a commendable objective attitude toward these devices offering both the advantages in terms of high potential efficiency and the drawbacks in terms of temperatures and materials.

Transmission Design

In the area of transmission design, attention was directed to computers for optimizing transmission design, a subject which was treated by Vince Converti of Arizona Public Service and M. L. Brown of Southern California Edison.

In another noteworthy paper, Ray Campbell, Alcoa, discussed the use of bundled conductors as a means of increasing line capacity as well as for the reduction of corona and radio interference losses at higher voltages. He also pointed up the problems of transverse loading and sagging which are associated with the use of bundled conductors.

R. F. Walker and C. K. Millen, Public Service of Colo.; D. L. Bryner, Utah Power & Light

New meter tester is demonstrated for the delegates at PCEA's E. & O. meeting

Somebody put a pretty girl in the slides at this session of PCEA's Berkeley E&O meeting

Dean Robert J. Parden, Santa Clara

D. J. Povejsill, Westinghouse

Al Fragall, PGE and Cliff Johns, PSP&L

Distribution

Distribution interests centered around underground practices and the selection of proper primary and secondary voltage levels. Both A. S. Anderson, Ebasco Services Inc., and A. L. Baxter, Allis-Chalmers Mfg. Co., treated the subject of secondary distribution voltages. Anderson compared the 240/460-v system and the 265/460-v system and indicated that the former was inherently more economical for utility use since both the voltage to neutral and the three-phase voltage could be used without additional transformation. He encouraged the utilities to take action in supporting code changes and the adoption of standards that will place both systems on an equitable basis. Baxter's final comments seemed to sum up the position of higher secondary voltages, "it looks as though voltages will be going up. But when, how much and where are questions no one of us can answer positively."

Moving to the distribution primary, R. C. Martin, Pacific Power & Light, discussed his company's use of distribution voltages above 15 kv. He pointed out that his company's 20.8-kv lines are in areas having low densities as great as 50,000 kw per sq mile and as sparse as 60 kw per sq mile.

On the subject of underground distribution, San Diego Gas & Electric Co.'s H. G. Dillin succinctly stated management's requirements for residential underground. He said, "management wants a system which will provide satisfactory service at reasonable rates, without undue discrimination." He continued, "to the extent these things can be accomplished, management should have no concern in meeting the growing needs for a system which will eliminate the aesthetic objections to overhead lines."

In a careful cost analysis, Carter Blankenburg, Southern California Edison, studied the influence of primary voltage and transformer spacing on the cost per lot for residential underground. For the conditions set up by the study, 12-kv delta proved to be a better all-around choice than either 4-kv or 480-v, the three primary voltages under study. Another paper of considerable value was Elrino Neher's, PG and E, "Criteria and Analysis For D-C Testing of Underground Cable." Neher indicated that of all the methods of testing cable insulation available, high-voltage d-c methods are preferred. He said that high-voltage testing makes it possible to locate incipient faults and repair them before faults cause serious damage to the cable and embarrassing outages that can inconvenience the public.

Speaking at NWPPA's E&O Workshop, Leon A. Harmon of Seattle City Light told of his utility having commissioned a professional landscape architect to design a layout for the grounds of each new distribution substation in residential neighborhoods. Further public acceptance has been gained by special programs to reduce transformer sound.

David E. Edwards, also of Seattle City Light, advised members of the distribution committee to "join the opinion of your customers and clean up your system before a crash program is forced on you to place your complete distribution system underground."

In Seattle, he pointed out, "neglect of the appearance of our overhead lines has caused our customers to demand a complete underground system." Since a complete underground system costs six times as much as a simple overhead system, he recommended a partial underground system, transmitting power in aerial cable on poles without crossarms but "burying the transformers along with other unsightly items."

Electronics

Tom Ferry, PG and E, and Ken Dueker, Southern California Edison, presented their views on transistorized VHF radios.

Admitting that the units were too new to critically evaluate, they took cognizance of the promise of increased reliability, a reduction in power consumption and increased compactness. Looking forward, they sensed that maintenance costs would be reduced but that, since the transistor is a thermal device, some additional attention will have to be given to cooling. Still another problem will be the training of technicians to maintain the equipment, which will include both education and retooling of the shop, since many of the instruments used for vacuum tube testing are not adequate.

An electronics round table chaired by Hugh Goldie, B. C. Electric Co., included F. W. Danielson, A. B. Day, J. D. Towey and W. R. Miller. Discussion centered on microwave carrier and supervisory operation. The opinion was expressed that annual outage time of 6 to 8 hours was satisfactory for a 7-hop system, also the opinion that pulse time modulation was not as desirable as frequency division. Discussing the relative merits

of carrier and microwave, the group agreed that the crowded carrier spectrum and inability to maintain good signal-to-noise ratio has placed carrier in the role of short haul link with microwave as the main trunkline of communications. One engineer indicated that digital techniques now being used for missile control might soon become available for utility use improving the security of existing supervisory equipment.

In a subsequent session, G. J. Hall, H. R. Moore, R. A. Radford and A. W. Adams joined the electronics group. The main topic was load control and telemetering. Another problem that came to the floor was the excessive wear of governor synchronizing motors when used for high-speed control. The power production group expressed dissatisfaction with the "spiking" on telemeter charts from noise bursts, particularly where carrier channels were used. The electronics group discussed methods for reducing or eliminating the complaint.

Communications

Speaking to NWPPA's communications committee, Harold Backen Jr. of the Douglas Electric Co-op voiced the conviction that the future will see "a gradual transition into the use of coded tones in the utility radio field," replacing the voice for communication purposes.

System Operation

On the operating side of the scene, the Western conventions covered a wide range of topics. A PCEA group discussed experience with insulator coating with silicone jell. Hydro and steam groups discussed startup operation and maintenance problems. Meter groups compared practices. In each case interest was high in "what did you do" and "why did you do it that way." Surely much good was done in these give-and-take sessions. In this area, a paper of particular merit was presented by Monty Mosquini and Jim Lighthipe, both of Southern California Edison, on the methods they have developed for the control and evaluation of distribution circuit interruptions. (Details of this paper will be presented later in ELECTRICAL WEST.)

In a similar vein, a panel of NELPA members consisting of Noel Hosea, Washington Water Power, Fred Helber, Pacific Power, R. A. Radford, Utah Power, Larry Horton, Copco, and R. J. Labrie, Montana Power, covered the problem of protective relaying and system planning. In his discussion, Larry Horton attempted to place some dollar value on kwh lost through outages. He concluded that, on the average, customers value lost kwh at about 12 times their price on the power bill. He continued, of course, that outages were a cost of doing business and that the customer usually takes out his losses in the form of resentment directed toward the power company. In the remainder of his paper, he presented some figures on relative resentment as a function of frequency of interruption, magnitude of interruption, etc.

Wallace R. Scalf, Benton County PUD, discussed the problem of "Meter and Relay Maintenance." He questioned whether routine field testing and maintenance programs of single-phase house meters could be justified on an economic basis, reporting his PUD's experience to be that less than 1% of its meters in this class are more than 2% slow after service of 15 years or more.

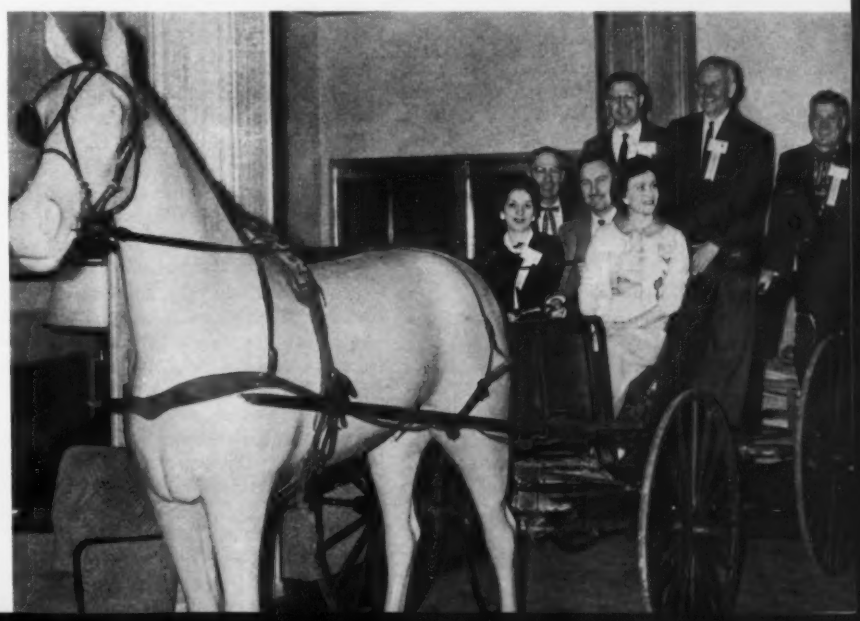
Construction Practices

In the area of construction practices, the press of increasing labor costs and the availability of ever better machinery creates a climate for constructive give and take and high promise of some dollar-saving ideas.

Jack Corette, Montana Power

In the Northwest, Cliff Johns' discussion of mechanization of distribution maintenance emphasized the opportunities that today's mechanized mobile equipment offers to the industry for high production. Johns' discussion indicated considerable thought in the selection of which piece of equipment would be most economical as a function of the amount of the task, such as hole digging, required per year.

Part and parcel of the discussion of utility mechanization must necessarily relate to the size of the line crew. In response to this question, Portland General Electric's A. D. Fragall pointed out that there can be no hard and fast rules, no standardized number of people per line crew. He emphasized that there are kinds of tasks where the addition of a fourth man to a three-man crew contributes nothing in either safety or production and other tasks where



It's easy to get to Missoula, says this group of E&O conference committee members from Montana Power and NELPA. Seated, Elsie Hamill, registration; David C. Johns, chairman of arrangements; Jeane Faulkner, NELPA secretary. Standing, Lamar Jones, assistant arrangements chairman; Al Krieg, NELPA executive manager; Ken Patterson, hotel reservations; Frank Pickel, treasurer

seven or eight men are a minimum.

Fragall emphasized that the size of the line crew is a management function and should not be subject to negotiation. He also emphasized that many times it made great economic sense to do a job with people rather than with machinery. The desire to mechanize should always have a firm financial basis. In similar discussions of automatic equipment, Percy Oldershaw, PG and E, presented a paper on use of aerial lift equipment. His discussion put particular emphasis on the high productivity of aerial lift equipment for stringing conductors in subdivisions using a two-man crew.

Southern California Edison Co.'s H. H. Carver gave an interesting presentation showing the kind and variety of new vehicles and auxiliary equipment presently in use by his company. Even compact cars came up for discussion, as N. J. McKenzie, Southern California Edison, indicated that the American-produced compacts are being accepted well at all levels in his company and provide economies. He indicated that, with improvements which will certainly come in today's compacts, he looks forward to a time when most of their passenger vehicles will be compact.

Contractor Line Construction

Retraining of journeyman linemen is being emphasized in the program of the Mountain States Line Constructors Chapter, NECA, more than the training of apprentices at the present time, Richard F. Peiper, apprenticeship director for the chapter, told the people at the Seattle meeting of NECA. New techniques and new equipment are bringing the need for retraining and adding to the knowledge of the present line crews, he said.

On new equipment available for line construction, Gerald A. Petersen, Petersen Engineering Co., Santa Clara, described many new types of devices recently brought out by all manufacturers, showing a film of the use of some of his own.

Greatest interest was created in his analysis of the cost to a hypothetical contractor with current assets of $175,000 and current liabilities of $100,000 (a ratio of 1.75 to 1) who needed $35,000 worth of equipment. The relative costs of purchase of the equipment outright, purchase on installment contract or lease on a long-term lease were presented in tabular form relative to maintaining the asset and liability ratio at a sound basis.

Utah Chapter, IAEI—Bill Gaffney, Northwestern Section secretary; Frank Stetka, NFPA field engineer, Chicago; Loran Christensen, Salt Lake City chief inspector; and William Whetton, Ogden chief inspector and Utah Chapter president, standing

. . . in Codes and Construction

Code Changes Few

Of the inspector meetings held at this time of year, at least two of them, Idaho and Utah Chapters' annual meetings, are something of an annual convention. The International Association of Electrical Inspectors, Utah Chapter, met in Salt Lake City April 20, the Idaho Chapter two days later at Idaho Falls. Both meetings were characterized by reports from Frank Stetka, NFPA field secretary, Chicago, and W. L. Gaffney, Northwestern section secretary, Tacoma, as well as active participation of the "old regular" Lester B. Johnson, G-E Co., Salt Lake City.

It is at such meetings among the chapters that suggestions for changes in the National Electrical Code arise, are argued, sometimes prepared in acceptable form and sent on to the sections for the fall convention approval.

Running through the code sessions was the chorus, "the code of Underwriters' Laboratories should make it impossible to ——." Stetka, Gaffney and Johnson, plus Ufer in Salt Lake City, rotated solo verses beginning "code provisions are a minimum standard for the prescribed conditions and may be in advance of the UL and manufacturers"; "the inspector must decide when the conditions have been met"; "a determined cheater cannot always be forestalled"; "brains cannot be packaged like merchandise"; and, "inspectors should allow a reasonable education period before enforcing new provisions."

There are some questions and answers most common to all of the inspector meetings, including the recent Oregon Chapter, Eastern Washington Chapter, Puget Sound Chapter, Southern California Chapter and Northern California Chapter meetings. Appearing in most of these meetings are the subjects of grounding, swimming pools, higher wattage lamps in fixtures and interchangeable circuit breakers. Among other debated topics are nonmetallic cable run in the voids of building blocks, the wiring of split outlets to avoid putting high voltage across them. At the Oregon and Puget Sound Chapters the problem of tracing conductors where both 277/480-v systems are mixed in the same raceway with 120/208 brought a recommendation that they be run in separate raceways.

Hazards around swimming pools have been particularly lively topics at the Northern and Southern California meetings, as well as the Arizona Chapter. Some concern was expressed at the Portland meeting. This problem has two aspects. The

Busy code panel at Idaho Chapter IAEI meeting—Ralph Foley, Twin Falls inspector and host; Les Johnson, G-E; Mark Lundy, Idaho State inspector; Hy Hansen, Idaho Falls inspector; Frank Stetka, NFPA, moderating; Bill Gaffney, NW Section secretary

first is the clearance of overhead service drops above or around pools which are cleaned by use of long-handled aluminum poles. The other aspect is the leakage of water into underwater lighting fixtures causing gradients of potential between the water and the surroundings, which cause shock and, in some cases, fatalities.

Grounding continues to be the more perplexing problem, particularly with the introduction of non-metallic or plastic water mains, the use of insulating bushings in the water lines by water utilities and even by plumbers to reduce electrolysis from dissimilar metals. Oregon Chapter recommends that the national code provision of grounding to gas mains be removed because of possible ignition of leaking gas.

At the recent Oregon Chapter meeting, Joe Gray, as president of the Northwestern Section, IAEI, admonished the members to put their code change proposals into acceptable form. Like so many others, he had made proposals in the past that never reached the code because the procedure was not followed. The procedure is given in detail in the appendix under "Rules of Procedure" in back of the National Electrical Code.

Warning was given in each of the meetings by Underwriters' Laboratories representatives — Karl S. Geiges, vice-president, Santa Clara Laboratory, and Charles Brooks, field engineer. Each spoke on the use of lighting fixtures with exactly the lamp sizes for which they were tested and approved. The same holds for other components. If other sizes are substituted, such as higher wattage incandescent lamps, the approval is voided. Only one fixture, they tell, has been approved for mounting against low-density cellulose ceilings so far.

Geiges, recently returned from Japan, described electrical industry conditions found there and, although UL inspection has been established on a few items, it has not been extended to many Japanese-made goods destined for the American market.

A delay in the deadline requirements for noninterchangeable circuit breaker panels, requested by the manufacturer because of time required to put new designs through Underwriters' Laboratories for testing, was presented to the various meetings.

Election of officers and other details of some of these meetings must await a subsequent issue for lack of space here.

"Bring Back IES Lamp"

Unlike other professional societies, the Illuminating Engineering Society, its National President Joe B. Browder, sales manager, Georgia Power Co., told the three regional conferences in the West, is creating a profession where one did not previously exist. He called for an all-out program by members to encourage colleges and universities to offer degrees in illuminating engineering and for the states to recognize such degrees in professional registration. His own State of Georgia has done so. Another unique feature of the society is the publication of its handbook based on its own researchers and its own technical committee reports. The research institute of IES has become its "research arm" and is contributing basic knowledge to society.

Browder urged members of the society also to identify themselves by placing the initials IES on their plans and designs alongside their name as do members of other societies in signing their work. He likewise urged that companies be canvassed to find out which would employ illuminating engineers if they were available.

In speaking of how to get the story of the society's work to the public, he said: "Let us take a look at one thing we did do in the early 1930s that, in the opinion of many, did more to get IES to the public than anything we have ever done before or since. We certified study-lamps by dictating the design. We hung a little tag on every one manufactured. The tag stated 'Certified IES study lamp.' Inside the folded tag was a story about the need and benefits of the lamp design, engineered and approved, by the Illuminating Engineering Society.

"In spite of the controversy I know I will bring down on my head, I am making a plea for a return to the use of a similar idea. There are many wise heads in our society that fear the stigma of commercialism to such an extent that to do anything, even involving a slight calculated risk of being so branded, would, in their opinion, be heresy." Continuing that such a plan as he proposed would not be commercial, Browder urged that a

Lloyd M. Grames, new Utah Chapter president, seated; Karl Geiges, UL, speaking

fixture labeling service tied in with the IES handbook be established for lighting equipment that met exact specifications and standards. Such typing of standards is already being done in regard to street lighting where recognized types 1, 2, 3, 4 and 5 are set up.

What are the various research programs of the institute? These were described in some detail by Cash Crouch, technical director of IES, at the Scottsdale and Los Angeles meetings. Continuing studies are being made by Dr. Blackwell on the evaluation of roadway seeing tasks, and particularly the loss of visibility to the driver because of glare from oncoming headlights. Additionally there is the work of Boynton on the ratios of intensities of the task to the surrounding area and of Dr. Chorlton on the effect of wider sources of light and that of Dan Finch of the University of California on the veiling effects of glare. Likewise, study is being made into color by Dr. Helsen and others. Findings of such researchers, he emphasized, are turned over to a committee who in turn develop recommended practices and standards.

Space Age Exploration

While the Seattle conference of IES heard a young negro engineer from Boeing Space Medicine Laboratory describe the experiments in which that company's plant is trying to develop an environment inside a space missile in which a man could live for a long period of time, the Hollywood conference had a different type of space exploration.

Clarence Larry at Seattle told of the problems of illuminating a space vehicle and of providing light enough for comfort and possible reading without monotony and irritation to a pilot locked in such a vehicle over a long period of time.

"Lighting in 1975" was the title given by panel moderator-conference chairman Bill Shalda, Shalda Mfg. Co., Burbank. On the panel were Charles Amick, H. L. Logan, B. Seegel of Welton Beckett-Associates, Walter Kirkpatrick, professor, USC School of Architecture, Henry Soubielle, Westinghouse Lamp Division, and Cash Crouch, IES technical director. They let their imaginations run riot as to what might possibly develop by 1975.

It started cautiously with suggestions that sizes of ballast and lighting equipment might be reduced, noise eliminated and then took off and even went so far as to suggest that ballasts produce music for atmosphere, walls be electroluminescent panels, and even that there might be frozen light which could be melted and used whenever wanted. Solar cells as power sources might eliminate the utilities and even firefly juice might be employed. It proved to be a stimulating and entertaining change of pace from the usual convention fare.

Squinting in the strong Arizona sun, these were the IES Intermountain Region chapter and section chairmen, plus a few more, who engineered the successful Scottsdale meeting

Economics of Light

The economics of lighting played a big part in many of the papers and discussions at the three regional conferences of the Illuminating Engineering Society. At the Scottsdale meeting, W. R. Davies, Westinghouse, San Lorenzo, discussed the installation, operation, maintenance, depreciation and amortization costs of various types of systems and occupancies from an economic standpoint. He covered not only the fixtures but the control methods, wiring distribution systems, switchgear variations, panels, breakers, even to substations.

An actual working installation of high-frequency lighting was described by Carl R. Albach, consulting engineer, Santa Fe. He described very much what was covered in his article on the lighting of the University of New Mexico's gymnasium and auditorium in ELECTRICAL WEST. The flexible switching to obtain several levels of illumination and the construction of luminaires to accomplish this was particularly interesting.

On the same subject of high-frequency lighting, George Howard of Wakefield Co., at Seattle, analyzed the benefits as well as the limitations of high-frequency installations, told where they were particularly applicable and gave considerable data as to the economics of the system.

As to the wiring cost, he compared it to about what would be required for a 277-v lighting system in a large building. However, where long circuit runs, very high mounting heights, reduction of the weight load on roofs or ceilings, reduction of heat or other economic considerations are important, the high-frequency systems would more than justify themselves, he said.

Quality of fixtures was discussed in some detail at the Intermountain meeting by Fred Guth of Guth Co., St. Louis, who showed the many quality features in the handling of the materials and the finishing of fixtures. The quality product was shown to be generally sturdier, more efficient and to have lower operating costs and a longer lasting finish.

With so many lamps and fixtures to choose from, John J. Neidhart, Miller Co., Meridan, told the Intermountain conference how to use room index systems, spacing and

mounting heights, to determine the type of fixtures and lamp selection.

"About two years ago a tremendous volume of data from tests conducted by Dr. Blackwell and his associates proved that higher illumination levels were needed for quick and accurate seeing of many visual tasks," said Charles L. Amick, research director of Day-Brite Lighting Inc., at two of the conferences. "But, to get full value from additional illumination, we must give careful attention to the entire visual environment, making sure to minimize direct and reflected glare which otherwise might reduce the effectiveness of many lighting systems or produce visual discomfort and distraction."

He said that the influential factors in determining the comfort or discomfort are source brightness, source size and position in the field of view and the surrounding brightnesses. He declared that a comfort evaluation system will be coming in the future to give more precise results than are available now, but that specifications of lighting installations should consider the concentration of the worker and the normal elevation of his direction of view as well as the visibility of his task.

The first lady and president of IES, Mrs. and Joe Browder, with James Barnes, v-p

Roadway lighting panel in Hollywood—Roy Matthews, George Fairbanks, Oscar Meissner and Supervisor Ken Hahn after the "light vote"

Crystal ball panel at Hollywood gaze into the future to predict lighting in 1975; Cash Crouch, Henry Soubielle, B. Seegel, Walter Kirkpatrick and Charles Amick

Light—New Sources, Tools

What is new in light sources and fixtures and methods? It is for the answer to this question that many attend the regional conferences. Usually they find many answers for the lamp and fixture manufacturers have new developments to show and explain.

Carl Allen, General Electric Co., Cleveland, did the "progress report" type of job this year at all three IES conferences. He also doubled on some programs to discuss the integration of lighting with air conditioning wherein the heat from the lamps must either be withdrawn and discharged to the outside in summer or turned back into the room to provide the heating when needed in winter.

In a quick presentation, Allen showed what he called the brightest, thinnest, cleanest, most attractive, most powerful, most concentrated heat lamps and most economical lamp. The most powerful is the new Xenon lamp designed to replace carbon arcs in military searchlights. The cleanest is the new quartz and iodine incandescent lamp in which the iodine returns the tungsten that is evaporated from the filament back onto the filament and keeps the lamp bulb clean. The thinnest and most flexible is the electroluminescent panel, still low in brightness and efficiency, but making some strides. The most attractive lamp, he said, is the new decorative tear drop lamp for home illumination.

He claimed as the most powerful lamp the fluorescent 8-ft tubular with the indentations. The most concentrated heat lamp is the quartz infrared lamp with bent ends. And the improved mercury lamp is now the most economical, delivering the most lumens per watt and having an 8,000-hour life.

While not new, the application of mercury lamps to interior illumination was described by Robert Wylie of Sylvania, Salem, at Hollywood and Seattle. He listed 10 advantages incorporated in the design of light-

Two vice-presidents—Roy Kreiser, the elect, James Barnes, the retiring one

IES speakers Carl Allen, G-E, Nela Park, and H. L. Logan, Holophane Co., New York

ing from mercury sources, such as: higher light output, greater economy, longer life, longer maintained light output, no obsolescence, increased color rendition now available, ease of control, compactness, ease to maintain, operation at any temperature and greater versatility. He illustrated his talk with pictures of installations of interior applications of this sort.

Plastics used in light control came in for some argument when E. S. Smyth of Rohm & Haas analyzed those used as light diffusers and recommended acrylics over polystyrene and vinyl, particularly for outdoor jobs. He said that the acrylics were the only plastic material which would last indefinitely outdoors without discoloration, and that their formulation requires no plasticizers. He admitted the acrylics are considerably more expensive, costing twice as much as polystyrene and three times as much as vinyl, but declared the longer life and greater dimensional stability often justified the greater initial outlay.

Smyth was challenged from the floor by Ewart M. Haacke of J. W. Wilson Lighting & Display Ltd., Toronto, who charged that Smyth had made an unfair comparison of the three materials. Flammability and weight of the acrylics often make them undesirable, he said, and vinyls can be made dimensionally stable by using several layers.

However, Smyth urged the illuminating engineers, in writing specifications, to use plastics "for the purpose for which they were intended." He said they were not a cheap substitute but materials in their own right, with unique properties no other materials can claim. He advocated that diffusers be designed "to last longer than a few years" and recommended plastics for such designs.

Maintenance came in for discussion at several meetings. The respective responsibilities of the lighting lamp manufacturer, the fixture manufacturer, the contractor and the owner were discussed by Leo Duval of Sylvania, Salem, at Los Angeles. He discussed maintenance methods and the frequency of maintenance cycles of washing equipment and replacing of lamps as well as making up schedules for this work. Factors to be considered were curves of lamp life, depreciation of equipment and character of the work in the area being lighted.

At the end of his presentation, Larry Creech, Lease-Lite Corp., San Francisco, showed pictures of an ingenious washing machine for washing plastic panels, which is used by his company in maintenance work.

Promise of relief at last from ballast failures and explosions, and all of the coincident irritations and damages resulting, came from George E. Peiper of Metals & Controls Corp., who spoke on and demonstrated new thermal protection for fluorescent lamp ballasts that all of the ballast manufacturers will soon offer. The six conditions causing ballasts to overheat and, hence, fail and the temperatures that were created by such conditions were first analyzed.

Actual fixtures operating with ballasts, in which failures were incorporated, alongside the speaker, demonstrated while he talked. By the installation of the thermal protector built into the ballast, the current is cut off at a controlled top temperature which is never allowed to reach a dangerous height. Although the ballast may cycle in again when it has cooled off, it will again turn itself off and thus prevent heat accumulation.

Even fixtures installed on low density cellulose fiberboard with thermocouples between the fixture and ceiling material attest to the safety of this type of protection. The protector responds to temperature, current or a combination of both.

Light for the Road

Under today's traffic conditions "one for the road" is considered highly dangerous whereas more "light for the road," while expensive, is highly desirable. Naturally, each of these IES conferences gave the subject prominent play.

Some European lighting methods were reviewed at the Scottsdale meeting by W. P. Lowell Jr., Sylvania Electric Products, Salem. His observations covered those during a trip encompassing England, Ireland, Belgium, Holland, Denmark, Norway and Russia in which he compared the techniques, variations in luminaire design, suspension and supporting methods and intensities, etc., of the various countries. He likewise compared lighting sources, such as incandescent, fluorescent, mercury and sodium.

An interesting point was that, although sodium lamps have shorter lives than mercury, their 100-lumen-per-watt output and distinctive color seem to be very much preferred in many places in Europe. Use of phosphors in reflectors rather than in the lamps themselves for color correction and other experimental mountings systems were also described.

Eugene Ireland, electrical engineer for the Washington State Department of Highways, told the society at Seattle his department has installed a contract for more than 1,000 lighting units on the state highway system in the past two and a half years, "in attempting to make our highways safe at night as in the daylight hours." He described the state's policy in lighting new freeways now under construction.

In addition to providing light at interchanges, the department provides continuous illumination where the freeway passes through heavily built-up areas, he said. Under such conditions, a design level of 0.6 f-c, with a uniformity ratio of 8 to 1, is considered satisfactory.

Washington's new lighting installations consist, generally, of horizontal burning mercury vapor luminaires mounted on 30-ft galvanized steel standards. "We are now using, wherever possible, the new ballast-in-head luminaires and clear 400-w lamps," Ireland said. "We have a few installations of color-corrected lamps, but for the present are observing them only. Only one or two installations using aluminum light-

ing standards are under observation too." The department plans installation of an interchange using the 250-w mercury vapor lamps in a rural area as a trial installation in the future.

It was the Hollywood conference, through a panel discussion, that went far out in groping into possible new concepts of roadway lighting. The keynoter was politician Kenneth Hahn, supervisor of the second district, Los Angeles County, who frankly stated that sponsorship of safety lighting at dangerous intersections and on roadways had proved popular vote-getting measures for him and he was all for it.

The panel itself consisted of Roy Matthews, assistant traffic engineer, California Division of Highways, George Fairbanks, division engineer, traffic and lighting, Los Angeles County, and Oscar Meissner, director of street lighting, Los Angeles City.

Lighting of off and on ramps and obstructions in the freeway systems of the state and of experimental methods used were described by Matthews. Particularly, he described the trial of electroluminescent panels for direction and off ramp signs.

"Farthest out" concept was presented by Fairbanks who suggested trying electroluminescent strips for the lane markings in the freeway paving. Painting of such strips, he said, loses all effectiveness under rainy conditions and the possibility that the light output of the electroluminescence might show up even through the rain was worth trying. He touched on possible cost of such a development, but felt that future improvement in production would soon reduce these costs on a major scale.

The need for special designs of luminaires to light hillside areas was presented by Oscar Meissner. With the flat land filled up in Los Angeles and more houses being built on the hills, a new problem arises to keep street lighting out of the windows of the houses above them or in the surroundings and yet provide good illumination. He showed a sample of one luminaire with adjustable shields as one approach to the problem.

Operation of high output fluorescent lamps for exterior applications, such as in gas service stations and outdoor flood lighting, was discussed by John L. Babcock, Nu-Art Lighting, Salt Lake City, at the Intermountain meeting. He presented charts to show the maximum light output for bare lamps occurred around 75 F but that, with proper design of reflectors to serve as a heat trap in cold weather, output could be maintained.

Comparing economics between lamps of various wattage ratings, Babcock said the high output installations are comparable to incandescent flood lights at the two-year point and that they show economic advantages after that.

There's an Art to It

"Judging a lighting installation by the number of foot-candles makes no more sense than rating an orchestra by decibels," said Ed Rambusch of Rambusch Decorating Co., New York City, in the course of a humorous commentary accompanying slides of many examples of artistic treatment of lighting to enhance and to blend in with architecture. He was one of several who brought forth the artistic sides of light treatment from the maze of technical aspects presented at these three IES conferences by the other speakers. Rambusch declared there must be constant agreement between architects and engineers because their knowledge of light alone is not enough. Most dietitians, he said, know all about food but are often lousy cooks.

Rambusch proved, with many of his examples illustrated, that traditional interiors cannot be overlighted and that adoption of arbitrary standards, as to light levels, etc., should be avoided.

From a residential lighting side, Rose Coakley, consultant of Thomas Industries Inc., Louisville, carried the same philosophy into the treatment of home lighting. Architects, she said, have regarded artificial lighting, particularly in the home, as artificial but scarcely necessary. On the other hand, illuminating engineers have stressed lighting for better seeing. Another aspect must be treated, that of the emotional changes that can be wrought by changing of the light pattern and mood.

She listed the various characteristics of the light sources, types of fixtures and illustrated, by a number of colorful slides, the applications of such fixturing and light treatment in residences. The need to use several types of treatment to keep from developing monotony was emphasized. Both Miss Coakley and Rambusch appeared at the Scottsdale and Hollywood conferences.

The importance of church lighting was emphasized by M. W. Terkel of the N-L Corp. at the Seattle conference. He estimated that more than 100,000 churches will be built

Decoration with light told by Rose Coakley, Thomas Industries, and Ed Rambush

or remodeled in the next 10 years. Church lighting standards are being steadily raised to 35 f-c now required where 12 to 15 were formerly considered sufficient. As a result, church wiring should be planned so that it will become adequate when the 500-w fixtures of today are replaced with 750 to 1,000-w tomorrow.

"Light, next to music, is the most important factor in the creation of a mood," he said, "this is why churches are paying increasing attention to their illumination."

A different approach to the same subject, perhaps, was the talk by H. L. Logan, research director of Holophane, who warned of the danger of creating too bland or sterile an environment by use of totally defused illumination from walls and ceilings or both. The physiology of the eye and of the seeing process was explained to show that the eye requires some direction of light to create shadow in order for it to define shape and form. With all shadow eliminated, the details of form are washed out, so to speak, and the purpose of lighting, e.g., to communicate information to the brain of the viewer, is defeated. Control of the shadow and direction, he showed, are as important as the provision of a general high level of illumination.

Still another control made available to the artist and lighting engineer was demonstrated quite artistically by Thomas Warren, Ultra-violet Products Co., Los Angeles. So called "black light" or ultraviolet, in certain frequency ranges, excites certain phosphors to emit a characteristic color each of its own. Thus, such lighting is highly selective and the artist or designer may use this consciously in application of color and luminescence to decoration.

This Warren demonstrated with a variety of equipment. The tubular-discharge type of light sources for production of ultraviolet are much to be preferred, he said, to the older bulb types and give a wider range of application.

Dr. Park H. Miller Jr., director of experimental physics group, General Atomic, luncheon speaker, with PCEA President C. A. Wikle and W. T. Quinsler, APS, vice-chairman of Administration Services Section, PCEA

. . . in Administration

Administrative Services took a long look at the new decade, with particular attention to the probable effects of changing methods and ideas. Accountants, perhaps more than any other group, are facing new procedures with the increasing use of electronic systems.

Internal Auditing

Steady increase in material costs and financing makes it essential that investment in material and supplies be held at a minimum for operational efficiency, B. F. Nash, Southern California Edison, pointed out at PCEA's joint conference with PCGA at Pasadena. Auditing stores accounting records has proved a challenge to the internal auditor, particularly in the past few years, with changes in procedure brought about by installation of machine accounting systems, he said.

Edison has converted its method of accounting for distribution plant to a system referred to as "unit of property accounting." Material and supplies are segregated into two classifications: "A" materials, major components, controlled and accounted for by individual store locations; "B" materials, loading items for units of property installed, accounted for through reporting of quarterly inventories to the centralized machine section.

Effective use of established material controls has helped to secure a very small inventory write-off. Nash said that annual distribution store inventory adjustments have been held below one-half of one per cent of the total annual disbursements.

Audit of outside contracts for construction or removal of plant is just as important as the audit of a utility's own construction activities, W. E. Littler, Southern Nevada Power Co., pointed out in a talk on auditing plant accounting records. Such a program will generally include materials and tools purchased, labor, equipment and tool rental, control of stock pile, cost classification and coding.

If the internal auditor is using last year's procedures today, he is already falling behind, Virgil F. Blank, partner, Haskins & Sells, declared in a talk on auditing in the '60s. With a 30% population increase forecast in California in the next decade and with power load probably doubling the 1955 figure by 1965, utilities can be expected to double their complex of men and machines, he said.

The past five years have been a stepping across the threshold from a 30-year period of key driven and punched card business devices into a new period of electronics. Although no one knows how long this period will last, one thing is certain, Blank said, we are somewhere near the beginning and developments are going to be up to us, especially in the area of internal auditing. The auditor can be passive, modify his audit program slightly and participate to the minimum in new system design. Or he can participate actively by contributing internal control ideas, designing more effective and efficient procedures and utilizing the power of electronics in carrying out his responsibilities.

Just as the internal auditor understood the step-by-step functions of the human bookkeeper, he should become informed on the characteristics of the electronic one, Blank advised. With such a working knowledge, there is every chance that he will resist the temptation to audit around the machine. Utilities have few EDP applications simple enough to warrant a "leap frog" approach, he warned.

Although the value and possibilities of a statistical approach to auditing are still widely debated, it is no longer possible to ignore what is being said and done in this field, according to M. V. Riley, Southern California Edison Co.

While the current feeling seems to be that it is not possible to adapt large segments of statistical techniques to auditing, the value of statistical sampling under certain conditions is well documented by case studies, he said, and the well-balanced audit program of the future probably will include at least some of the statistical methods already developed.

Judgment sampling, which does not depend on such rigid requirements as statistical sampling, is another tool for the auditor, Riley said. Use of statistical sampling does not interfere with the requirement for exercise of individual judgment but actually supplements it.

A progress report on Arizona Public Service Co.'s three-year experience with auditing electronic systems was given by Marle J. Wardenburg, who stated that he has yet to hear any complaints after individuals had acquainted themselves with the system and were able to properly identify and use the information.

Land and Right-of-Way

California Supreme Court decisions in the field of condemnation, problems of right-of-way encroachment and experience with respect to betterments were covered in a panel moderated by David Barry, Southern California Edison, and including Edward J. McGanney, PG and E, Oliver Owen, San Diego Gas & Electric, Allan Cleveland, Southern California Gas Co.

Early participation by company employees with representatives of the Urban Renewal and Redevelopment Agencies will save time and money where rearrangement of facil-

Donald J. Carman, California Electric Power, Legal group sponsor; D. R. Green, San Diego G&E, Insurance and Claims

G. L. Harvey, Edison, sponsor of Land and Right-of-Way group, with PCEA Section Chairman R. W. White, PG and E

ities is required. This was one of many points brought out in a talk on redevelopment projects by K. J. Diercks, PG and E, who said that his company had suggested a legislative declaration of policy on cost of relocating utility facilities installed under franchise.

There is a limited market for rights-of-way today; there will be no market tomorrow, declared J. W. Frost, PG and E, who told of the growing complexity of land work. An intensive study of future needs and the ability to project requirements well into the future is one solution, he believes. Another is through training of right-of-way men, who should know themselves, their company, their job, their client and his kingdom.

Questions thrown out by Frost: Should there be joint utility and planning boards of state-wide scope and authority to review mutual plans and problems? If it is logical for local planning agencies to designate green zones, industrial zones, commercial zones and virtually every other type, then should they not reserve utility zones for transmission needs? Should not the private utility, like the federal agency, have the right of immediate possession? Frost emphasized that he did not advocate regulatory measure by any planning body but provision for utility zones when approving land development.

Changing views among experienced appraisers seem to warrant the suggestion that we all take a new look, without reliance on procedure personally accepted in the past. This is the belief of Ralph S. Bowdle, M.A.I., who stated that the problems arise from the taking of (1) an easement over an easement; (2) an easement over a fee; (3) a fee taking of an easement; (4) a fee from a fee. In cases three and four a license or permit must be given by condemnor to condemnee, permitting continued operation of the first established facility.

Pointing to the problems arising from regulations and restrictions of the federal highway program, A. B. Gilbertson, California Pacific Utilities, urged that utilities continue to make a concerted effort to get their objections before the Bureau of Public Roads and their Congressmen. Since Bell Telephone companies have to a large extent abandoned the use of highways, other utilities are handicapped in getting beneficial legislation, he said. With legislation introduced in 42 states, 17 enacted some degree of relief but since then litigation is involving most of them. Rate payers, who continue to think it is better for them to pay the bill than to have relocation costs come out of some so-called sacred highway fund, will probably feel differently when and if these costs force rate increase applications.

T. E. Parker, PG and E, Internal Auditing sponsor, with Virgil Blank, Haskins & Sells, a conference speaker

N. R. Kidder, who addressed the Economics session on "To Lease or to Buy" talks with Sponsor Paul Murdoch, Edison

At District 8 meeting Arthur Stuart, vice-president A. L. Rowe, NECA President Harold A. Webster and Floyd Shipp, field

Contractors Have Problems Too

While contractors may have different terms for this department of their business, they have similar problems. Instead of personnel they may call it labor or manpower. Certainly credit and collections are pertinent. Likewise are operations of the accounting and other functions of the business. Chapter operations and administration too come within their scope.

Traditionally the personnel problem of electrical contractors has been met through union agreements with the International Brotherhood of Electrical Workers. But the labor legislation of the past few years, beginning with the Taft-Hartley Act and more recently the Landrum-Griffin Act, has whittled away the monopolistic combination to "control" the electrical work and channel it into the contractors hands.

This, in essence, was told in a paper by Paul Geary, executive vice-president, NECA, at both the Phoenix and Seattle district meetings. It was read in Seattle by Charles Scholibo, Western regional manager. Unless the "on-site picketing" amendment is passed, the unions' help in controlling of electrical work for electrical contractors will also be gone. Unions, said Geary, will be reduced to the same status as that of associations.

Hence, contractors and unions will have to sell union shop contracting to the public. Despite the close working of union and contractors, an ever larger percentage of the total electrical construction in the nation has been slipping away to others, it was brought out.

Serious new problems include manufacturers who move in and sell an entire project on an installed basis. This has been particularly prevalent in electronic and missile installations recently. Telephone companies and large national manufacturers are doing the same and furnishing labor for the installation from other sources.

Most recently have been some tunnel, highway and dam construction in which the union at the national level, to save the work for its electrical workers, has entered into agreements over the heads of the local agreements.

Resolutions deploring such actions were passed at the NECA conventions later.

That both contractors and union must abandon the knob and tube philosophy of the past in this electronic age was the admonition of Oscar Harbak, IBEW District 9 vice-president, who took a more constructive attitude than his companion Lee F. Anderson, vice-president, District 8, IBEW. Anderson spoke of old-school methods of "controlling the work." Harbak, on the other hand, spoke of the need of employers and union to get together more often and work out constructive programs to get the maintenance work that has been lost in large plants, luminous ceilings which have gone sometimes to other crafts, communication and sound work, electronic work, etc.

Great changes are taking place and others "get into the act," he said. If electrical contractors and IBEW want to do this type of construction they must prepare themselves to do it acceptably.

The Phoenix meeting for the 19th time was a joint meeting of District 5, NECA, and District 7, IBEW, and many general sessions were presided over alternately by A. E. Edwards, District 7, IBEW, vice-president, and G. C. White, District 5, NECA, vice-president.

Another facet of the personnel situation is the training of apprentices. In this the joint efforts of union and contractors have been highly successful. James F. Ripley, outstanding apprentice in 1959 for Local Union 387, Phoenix, addressed the Phoenix meeting, telling what his apprenticeship training has meant to him. Murray L. Wykes, specialist in training for the Austin, Tex., Chapter, described training programs for journeymen in that area. Additional training was felt to be necessary in bringing experienced journeymen up to date on many modern methods, tools and developments, particularly in electronics.

Credit planning was dramatized at the Seattle NECA meeting in a skit previously presented at last year's Miami convention. Karl Stolting of Santa Rosa and Paul Briggs of Spokane enacted two contractors applying for credit to a supplier, a bonding company and a bank. The well-prepared business condition statements enabled one to get ready credit while the lack of these helped to deny the other a needed loan. DeLoss Seeley enacted the banker, Robert H. Hoff a bonding company agent and C. C. Bradberry of Graybar the supplier.

One of the most important administrative functions of a contractor's business is that of estimating and costing. Since 1918 the NECA, through voluntary committee work, has been accumulating labor cost data in terms of man-hours of work required for certain operations and installation of products. These data are assembled in its Manual of Labor Units.

E. R. Cornish, NECA director of research and education, reviewed the entire history of this manual and its preparation, outlined definitely its limits and strongly urged for more participation in the furnishing of data relative to new methods and new techniques.

Hosts to the NECA Tri-District Seattle meeting—Kernan Dennis, president, Puget Sound Chapter, Howard E. Bayley, general conference chairman, chapter past president

He employed a panel consisting of contractors L. M. Stewart, Spokane; Ralph Johnson, Denver; Glenn Bockman, Stockton; Gordon Smith, Spokane; Ralph Ekert, Wenatchee; and from the Hanford atomic energy project Wes Lucky, to check on the usefulness of the labor data, how many contractors are applying it and how it can be improved so that more will use it.

Administration of a chapter of contractors in a way that will always keep it within legal limits was discussed at the Phoenix meeting by Lawrence E. Martin, manager of the Dallas Chapter.

Communication Needed

"It is not merely the transmission of a written or spoken message through the medium of typewriter or vocal cords," said D. C. Houston, director of communications, Kennecott Copper Corp., in addressing the banquet at the Utah chapter IAEI. "In its finest sense, communication is the achievement of understanding among all people." Making a very wise analysis of the whole subject of transmitting information between people, perhaps the gist of what he had to say is contained in these words:

"Unaccustomed as they have become to leading by persuasion and effectively planned communication, and stymied by Wagner Act restrictions which often prevented management representatives from speaking directly to employees, management became increasingly unable to communicate business objectives. Moreover, various forces professed increasing interest in the workers' so-called problems, tending to divide still further the loyalties once taken for granted between American industrial workers and their management.

"Despite these facts, many managers are still inclined to take the necessities of plant communications for granted. Many employers assume that communication — like conversation — will take care of itself. The result inevitably is the growth and perpetuation of misunderstanding. Because employees do not know what management is thinking and planning, they imagine the worst. Some management representatives on the other hand, don't trust employees, lacking upward communications — one means of providing an understanding of true employee needs and attitudes.

"From ignorance of this sort, rumor and gossip emerge through the 'grapevine' to aggravate an already sensitive situation."

Panel deliberates at NELPA's program for sales management personnel. From left: O. J. Horrom, Montana Power; A. S. Gilbert, Idaho Power; Gordon DeFoe, WWP, moderator; Darcie White, UP&L, presiding; C. W. Brissenden, PGE, D. H. Olney, WWP. Not in picture: R. F. Plymire, Puget Power; Bruce Heywood, G-E Appliance and TV district manager

. . . in Sales Development

Philosophy of delegates to NELPA's 35th annual business development conference at Yakima might be summed up about this way: There is no simple answer to any of their problems; competition is here to stay but so is confidence in the future and a determination to "Sell All-Electric Allways."

Sales Incentives That Work

Although any reasonable sales incentive will work and will work well, given the proper conditions, no incentive will work all the time. Hence, variety is the essence of sales incentive at any level—utility salesmen, dealer salesmen or customer —said Clifford B. Hall, Stone & Webster Service Corp., New York, at the opening session of the NELPA conference.

Five essentials of any workable plan are ingenuity, excitement, coordination, enthusiasm and follow-through. Leave out just one of these factors, Hall said, and the prospects for success are not cut by 20%, they are cut way below the level where they will justify the cost of the plan.

Only accurate and realistic measurements of your results can tell whether your sales incentive is really working for you, Hall declared. Are you selling more appliances this year simply because of increased population, increased spendable income, more new construction? Would you have sold that much more without a sales campaign? These and other questions should be asked, he believes.

Since a man—the sales manager—is what makes an incentive work, Hall suggests a program for developing successful sales managers within each company. That way tomorrow's success will be secure.

Is Gas a Real Competitor?

Although there was a difference of opinion on the value of such emphasis, gas competition was a scheduled topic by NELPA at the general session and at the Electric Home Bureau. Not even the Roman riders, however, claimed anything but a price advantage for gas which one of them characterized as simply a fuel to burn as opposed to electricity, a high-grade energy resource.

In a talk that found a good many challengers, C. A. Manson, rate engineer of B.C. Electric Co., based his remarks on two tables: (1) Price at Which Gas Competes With Electricity in Six Areas, (2) An Analysis of Comparative Costs of Operation for a 500-Hp Compressor Installation—Gas vs Electric. Considering price and other factors, such as product acceptability, he gave the definite edge to electricity in only three areas: residential cooking, clothes dryers and domestic refrigerators.

With a downward price trend and improvement in density and saturation, Manson sees the gas distributing companies in the Northwest as beginning to go through the kind

NELPA Business Development Chairman Reg Plymire, Puget Power; A. W. Trimble, vice-president of PP&L, host company; Olin Ririe, Utah Power & Light, vice-president of NELPA

John Mead, Edison, and Cliff Hall, Stone & Webster, speakers at NELPA conference

of market development that characterized the electric industry during the '20s and '30s and produced the ever-declining price per kwh.

He summarized the facts of life as they look to a gas company at the end of long pipelines. With company purchase price on a demand and commodity basis, they must sell large volumes of gas, i.e., to the space heating and boiler fuel markets. Although the latter improves load factors, there are still large summer valleys, which must be filled by building year-round base load revenue. With limited opportunities because of the limited number of things that can be done with gas, Manson declared that the companies must make a dead set for those uses that are open—with cooking and water heating right at the top.

While he recognizes gas as a real competitor, Clarence Kommers, Montana Power Co., finds other competitive forces just as lethal. Pointing out that while sales volume was at a record high, electric major appliances were getting a smaller share of the discretionary income in 1959 than they got in 1955, he reminded that it is possible to win the battles and lose the war.

Discounting pessimistic notes, Kommers and other speakers pointed to the inroads of electric heat against gas during the past five years despite the fact that more and more homes are receiving gas service. As one speaker pointed out, "people will buy what they want, just don't try to sell Cadillacs at Chevy prices."

Commercial applications vulnerable to gas competition, according to Wes Dunn, are cooking, water heating, space heating and, in the future, air conditioning. In this competitive area, he said, there's probably 25% of the present commercial load and 35% of the future load.

School Heating and Ventilation

Electric heat for schools was considered by a panel of NELPA's commercial and industrial men, moderated by A. B. Couch, Puget Power. In its search for sales opportunities in merchandising off-peak kwh, Puget, whose system peak during the winter season occurs on a week day between 4:30 and 6:30 p.m., studied the problem of heating schools electrically. William Carkeek, sales consultant for the company, with rate and application engineers, devised a primary service rate based on a controlled off-peak.

Since January 1959, 18 new schools in Puget Power's service area have selected electricity for space heating. This program was presented to the panel by Carkeek. Wesley Dunn, Pacific Power & Light, reviewed his company's experience with the Hamlin Junior High School in Springfield, Ore., and Blair Plowman, Washington Water Power, told about the installation at Grangeville School. Electric heat presents an opportunity for utilities to offer schools a service that results in lower capital costs, competitive operating costs and superior comfort, the panel pointed out.

These PP&L men kept NELPA session running smoothly. Jack Kelly, third from left, was arrangements chairman. The boys in costume from left: Ralph Ogle, Vern Hartford, Carl Clogston, M. D. Wall, Tom Sears

Higher Voltage

Increasing delivery voltages in new large commercial buildings to 480 v offers economics in construction where heavy air conditioning, refrigeration and office machine equipment will be used, G. A. Engbloom, Calgary Power, told the NELPA meeting.

Consulting engineers in the Utah Power & Light service area have estimated over-all savings in wiring and other costs at 15 to 20%, according to Darcie White. UP&L is using 277/480 v in these larger buildings almost universally and finds advantages for the customer, architect and builder. For the power company, there is no advantage if compared to the 120/208-v wye system. However, when compared to a 120/240-v delta system, there is the advantage of a much better balanced single-phase load on each leg of the three phase.

Air Conditioning

Although air is man's first and greatest need, the industry at no level has done any kind of continuous job in selling the idea of air conditioning, Joe Heffernan, General Electric Co., Tyler, Tex., told NELPA's commercial and industrial men. While he finds this true all over the United States, he gave as an example southern California where 2% of the homes are air conditioned.

Year-around, heat pump air conditioning will sell health protection 365 days, Heffernan declared, adding that temperature control is less important. Cost worries the industry, he said, although he does not know why. The public, he pointed out, spends billions to go to the seashore or the mountains for wholesome air that they are not going to find there. They buy filter cigarettes and breathe air teeming with injurious particles. They spend dollars trying to stay clean and breathe in dirt.

The industry has introduced great products, Heffernan said, but none of them compares with the benefits of air conditioning. Let's have air satisfaction, he concluded.

Utility's Place in Servicing

Since today's consumer is willing to pay for good service, electric utilities can help themselves and their customers with a very small investment in service organizations and facilities. This is the contention of W. B. Creech, manager, Appliance Service Division, Westinghouse Electric Corp., who points out that inability to provide proper customer service discourages many small town merchants from selling major appliances.

Creech believes that utilities can provide this service on a contract basis with such dealers to provide in-warranty service and can economically provide out-of-warranty service for their customers beyond the warranty period. He suggests that utilities (1) establish portable appliance service stations, (2) offer to contract with dealers, distributors and customers to service major appliances sold on rural lines or in small towns, (3) add service coordinators to the pay roll to work with, train and help dealers, (4) make space available to dealers, distributors and manufacturers to service trade-ins.

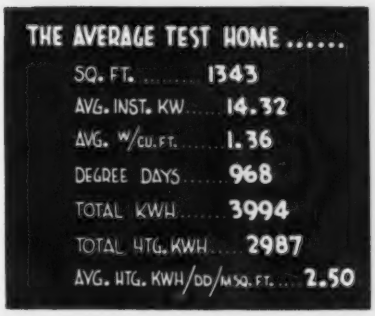
Where utilities are collecting portable appliances in outlying areas and bringing them into central points for service they are doing at little or no cost a job that is particularly appreciated by rural customers, Creech pointed out. The result is thousands of appliances being returned to service rather than being thrown away or junked.

Electric Heat Study

Awaited with interest, results of NELPA's space heating study were announced at a joint meeting of the Electric Home Bureau and the Rate Research Committee. A summary and analysis, prepared by Washington Water Power Co., was presented, with Gordon DeFoe, Duane Olney and H. U. Wright participating.

In an attempt to determine electric heating patterns in the Northwest, a coordinated test program was set up. Five companies—Puget Power, PP&L, PGE, Idaho Power and WWP—agreed to meter simultaneously at least ten primary heat single-family dwellings, selected at random to represent a cross section of the electric heat load. Since it was desirable to observe load characteristics during peak conditions, the period from Jan. 5 to Feb. 5, 1960, was selected. Metering on each home included kwh and continuous charted demands on the total load as well as the heating load.

Choice of the test period was happy, since it covered system peaks and coldest recorded weather in nearly all areas. In one case the system peak fell ahead of the test period by one day. Usable data were obtained from 50 homes. Two companies used 15-minute Lincoln curves; two used one-half hour averaging demands; one showed one


THE AVERAGE TEST HOME .....
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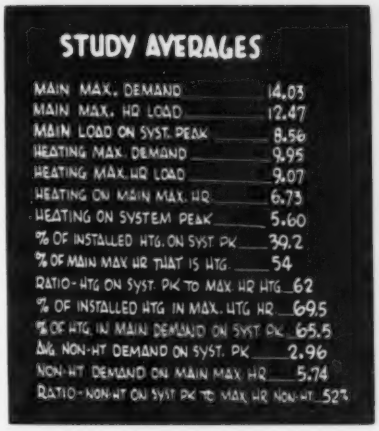
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MAIN MAX. HR LOAD 12.47
MAIN LOAD ON SYST. PEAK 8.56
HEATING MAX. DEMAND 9.95
HEATING MAX. HR LOAD 9.07
HEATING ON MAIN MAX. HR 6.73
HEATING ON SYSTEM PEAK 5.60
% OF INSTALLED HTG. ON SYST PK 39.2
% OF MAIN MAX HR THAT IS HTG. 54
RATIO - HTG ON SYST PK TO MAX HR HTG. 62
% OF INSTALLED HTG IN MAX. HTG HR. 69.5
% OF HTG. IN MAIN DEMAND ON SYST PK. 65.5
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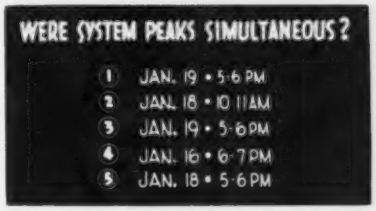
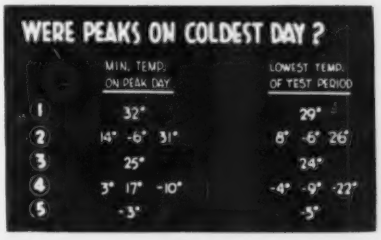
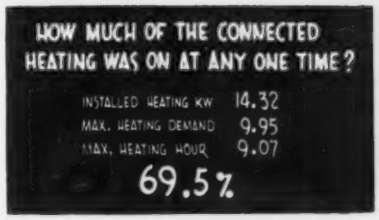
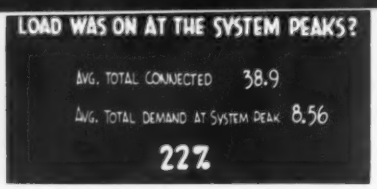
NON-HT DEMAND ON MAIN MAX HR 5.74
RATIO - NON-HT ON SYST PK TO MAX HR NON-HT 52%

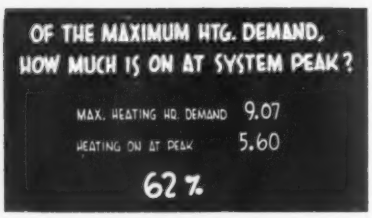


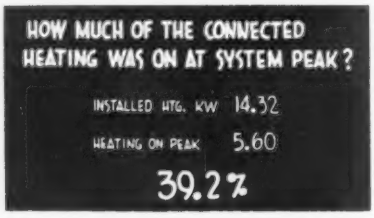


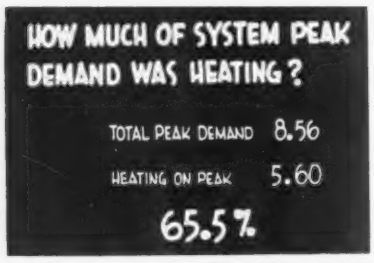

HOW MUCH OF THE CONNECTED HEATING WAS ON AT ANY ONE TIME?
INSTALLED HEATING KW 14.32
MAX. HEATING DEMAND 9.95
MAX. HEATING HOUR 9.07
69.5%

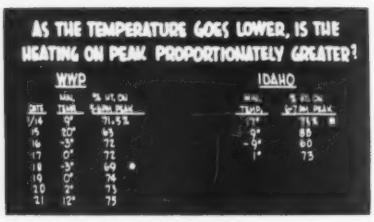
Slides from presentation of NELPA space heating survey are reproduced here and on next page. Washington Water Power made report

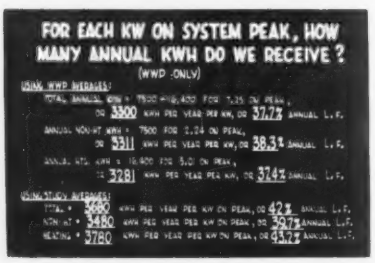


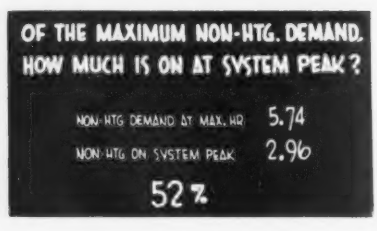












hour average demands. The findings were first summarized for each company to observe similarity of results. They were consistent enough for an average of the five to be prepared to illustrate the over-all effects of the load and to form the basis for a clear reporting of the study, it was stated.

Some of the slides shown by Wright are reproduced on these pages. General conclusions reported:

Though the system peaks all occurred a few days apart, they were not all simultaneous. In only one case did the system peak fall on the coldest day of the test period. Of the total connected load an average of only 36% of it was ever on at any one time in any home. An average of 69.5% of the installed heating was the most that was used at any one time in each home.

An average of only 22% of the total connected load was on system peak. A certain portion of the maximum total demand recorded in each home was nonheating. The nonheating demand during system peak was 52% of the average of these amounts. The maximum heating demands for each home were averaged. The heating demand on system peak was 62% of this average. Of the connected heating only 39.2% was on at system peak. Of total demands on system peak, 65.5% was heating.

The percentage of electric heating on peak does not necessarily increase as the temperature goes lower. An analysis of 11 homes showed that there was no parallel between temperature drop and this percentage. In fact, the amount of peak attributed to heating was considerably less at system peak than on many warmer days at the same hour, it was found.

Load factor information for each area was not summarized because nonheating kwh usages were not accurately available. However, analysis of one company's data, where the information was available, showed: total load, 3,300 annual kwh per kw on peak, or 37.7% load factor; nonheating, 3,311 annual kwh per kw on peak, or 38.3% load factor; heating, 3,281 annual kwh per kw on peak, or 37.4% load factor. General accuracy of these figures was substantiated when study averages were applied to this company's conditions.

Live Better Electrically

In an appraisal of the LBE program by NELPA's Electric Home Bureau, it was pointed out that, while the local effort has been good, more impact is needed on the national level. Since this requires dollars, it was suggested that EEI do a more intensive selling job on top management. With high saturations in major appliances, many Northwest companies "did not choose to run," when the program was introduced.

Pointing out that the Housepower advertising program has been a casualty for "reasons nobody can argue with," Frances Armin, National Wiring Bureau, asked the group's opinion on continuing this promotion. Since EEI got Housepower off the ground, would it be logical to assume that another industry would be willing to carry on in some form to maintain enthusiasm already developed, she wondered.

In other panel discussions, the Electric Home Bureau considered Medallion Home progress; how to work more closely with realtors and appraisers; obstacles in selling electric heat and methods of competing with other fuels.

Contractors Should Do the Selling

"Business development is a phase which we as contractors have badly neglected," said Harold Webster, national president of the National Electrical Contractors Assn., at both the Phoenix and Seattle conferences. "This involves selling and should be handled by people who sell because they like to sell. The electrical contracting industry has attracted people mainly with engineering and mechanical tendencies and like everyone else they do best what they like to do and neglect what they don't like to do.

"I believe that NECA will be making a contribution toward its objective of increasing the volume of profitable business available to qualified electrical contractors if it develops a method of finding people who like to sell, providing them with such training as may be required and making them available for employment by electrical contractors.

"However, and this is the point I stressed so strongly to the NAED in Dallas, such a program would not be fully effective unless it is participated in by the suppliers and includes a plan under which they will progressively turn over to the contractor our industry's consumer sales function where it belongs, at a profit. At least some of the salesmen now employed by the suppliers should be employed by the contractors and efforts to plan something of this nature are now being considered."

Later he said that NEMA had agreed to assist and promote a sales training institute by participation in

a national joint industry advisory committee.

Webster forecast that the construction industry can expect to build the equivalent of an entire new nation before the end of this century. This forecast, he said, had come from estimates made at a recent meeting of the National Construction Industry Conference.

A general contractor on the program, the immediate past president of AGC, James Cawdrey, spoke of the joint conference of 18 unions and a similar number of construction trade associations, organized to sell the contract method of doing construction work as opposed to a type of "do it yourself" by the large industries with their industrial union employees. Another outgrowth of the conferences, Cawdrey said, was the desire on the part of others in the construction industry to set up a "supreme court" for adjudication of labor disputes somewhat along the pattern established by the NECA and IBEW in the Council on Industrial Relations.

Of legislation for control of bid peddling and shopping, however, the AGC spokesman asked patience in trying out the voluntary listing of subcontractors by general contractors as recommended in its recent convention in San Francisco.

Other outside views of the contractor's market as well as responsibilities were presented at the Seattle meeting by an architect, a consulting engineer and later a supplier, Irving Bean of Seattle.

The architect, Lawrence Waldren, president of the Washington Chapter, AIA, reciting some of the great changes in construction practices, methods and regulations, stressed the need for better coordination of the crafts on a project. This task has been dropped in the architect's lap, but with the increased complexity of the business, it is one needing assistance from the contractors.

A greater burden is placed on the plans and specifications. Control of substitutions is a problem because new developments must not be blocked but neither are all substitutions "equal." Supervision is a much more difficult problem.

Overlapping jurisdictions, he said, present the hardest problem to solve but, since this was a family affair, the family should be able to settle it within the industry. "Family squabbles are very poor public relations and can be blown up by the public to undue proportions," he said. Each segment of the building industry must have a strong and ethical organization, he said, which

At the Electric Home Bureau session: Clarence Kommers, Montana Power, chairman; Frances Armin, National Wiring Bureau; Laurence Messick, Medallion Home, NEMA

At the Commercial and Industrial meeting: A. B. Couch, Puget Power; W. A. Lowe, BC Electric, chairman; Joe Heffernan, G-E Air Conditioning Division, Tyer, Texas

Jeane Faulkner, NELPA, draws the winning number in the Early Bird awards from Tom Sears, Pacific Power & Light. Al Krieg, NELPA executive manager, looks on

NECA contractors at Seattle plunge into a self-appraisal workshop sample session to check their marketing past and future

must be willing to sit at the table and resolve such problems. Above all, the industry must not fear change but be sure that such changes are constructive.

"Teach your uncultured brethren to trade up," said Walter Gordon, consulting electrical engineer, in a good humored scolding as he spoke of electrical specifications and what contractors do to them. The next big market coming along, he said, will be electric heating and he hoped that the contractors would not let it go by them as they had with water heating. The mechanical engineers and heating contractors are busily after electric heating right now, he said. Likewise, he pointed to the tremendous rewiring market available which, he said, "if there were to be no new electrical construction, there is more than enough rewiring to be done to keep us all going at top speed."

At NELPA meeting, Charles Parker, Central Surveys, right, talks with Harold Anderson, WWP, who was pinch hitter for W. W. Bowman as chairman of the PR and Advertising sessions

He urged careful reading of specifications each time. "You know we are likely to change them occasionally." As for substitutions, he urged to make sure that equal really meant equal. Likewise, he said that contractors would do more for their business if they affiliated themselves with other associations, such as IES, the electrical inspectors, AIEE, etc.

The "Keep Pace Electrically" program, being developed by NEMA and the National Wiring Bureau, was presented in some detail by Andrew H. Corman of the bureau. This program, aimed at promoting industrial and commercial rewiring in particular in the millions of small businesses in the country, should prove of greater benefit to most contractors than the residential programs that have been so successful, he pointed out. Aids and promotion materials and plans for organizing drives in communities along these lines were outlined by him.

Although a resolution had been prepared by one chapter of NECA to be presented at the conference condemning the program of some utilities in installing and capitalizing service entrance equipment, when Georgia Power's sales manager, who was at the neighboring IES conference as IES national president, came over he dispelled all their fears and no resolution reached the floor.

Browder explained in some detail the Georgia Power Co.'s program and showed how his company has financed the larger service entrance equipment and owns it but that all of the work of installation and maintenance is being done by contractors. How this has led to a greater percentage of the building dollar going into other electrical wiring and equipment and has even made residential wiring profitable for NECA contractors in his area convinced the group.

Browder took occasion, as IES president, to point out what the new lighting levels have meant in seven buildings in Atlanta, six of them totally electric even as to heating as well as lighting. He urged contractors to sell such installations and benefit from the new recommended standards.

An electric heating panel was a special feature of the Phoenix NECA joint meeting. It covered the scope of the market, the selling of electric heat, the promotion of heating sales and NECA's preparation for this market. On the panel were Tom Hart of Montgomery Bros., San Francisco; B. A. LaBarthe, Westinghouse; Frank Eddins, sales manager, Kansas Gas & Electric; and Col. P. T. Bobe, chairman of the NECA research committee, St. Louis.

The lighting market ahead was predicted at the Los Angeles IES conference by Gene Pauly, General Electric Co., as one that would continue to double in the next 10 years. Relighting alone would contribute half of the total volume. Many rebuilt installations are paying for themselves out of savings within a relatively brief interval because of improved productivity, safety, etc.

The market is further expanded.

he told the group, because of lighting systems incorporating heating, air conditioning, ventilation, sprinkler facilities, public address and even color control. An interesting prediction was that rapid-start lamps rather than preheat or slimline would increasingly take over.

. . . in Public Relations

We are fighting in a world of words and many of the ones being used by the utilities are slow poison, it was pointed out by Charles Parker, president of Central Surveys, Shenandoah, Iowa, in a talk addressed to NELPA advertising and PR men but heard by others at the Yakima Business Development conference who joined them for the session.

Parker is now working on semantic and image studies for an industry group and a Western utility. In trying to find the right and wrong words for the individual company, the industry and for federal activities, three criteria are used: (1) Is the word meaningful? Does the public understand it as we do? (2) Does it differentiate properly between one kind of system and another? (3) Are its connotations favorable, unfavorable or neutral? Is the word acceptable and is there a chance of getting it used?

The words public and private fall down on all counts, Parker said. Of the tested substitutes, investor owned stands up well; shareholder is good on two counts but does not differentiate between companies and co-ops; business managed does not define what is meant.

Four terms—nationalized, federalized, socialized and political—were tested to designate federal activity. One and two stood up well, three and four did not, Parker said.

Although power companies stand well locally, Parker believes that they need a more positive image, with concepts close to the surface. A serious situation brought out by the image survey was that criticism of the company stepped up as kilowatt-hour use increased—from 12% critical in the $8-a-month bracket to 37% when the bill was in excess of $15. Since these higher use people will probably be the most influential in their communities, they should be the prime targets for value of service advertising, Parker believes. Why not copy the air lines and recognize the hundred-thousand-mile customer? he asked.

Political Action

Another highlight on the NELPA program was a discussion of General Electric's program to encourage its employees to be politically active. Robert E. Rose, manager of education, communication and community relations at Richland, Wash., stirred up questions from the floor.

RMEL's Information Committee devoted its entire program at the spring conference to political action. Dallas L. Cook, Denver Chamber of Commerce, explained generally what forms industry's action on politics had taken and outlined present programs. He called for direct action at the grass roots by everyone genuinely interested in preserving the American Way.

Dan McNellis, Public Service of Colorado, told of his company's specific programs and after-hour course in practical politics. He cited results of a survey taken within the class and revealing how much constructive political thinking had been generated in a relatively short time.

The session concluded with representatives of both major political parties explaining the effect industry action in politics would have on party activities. Both called for more concerted effort by industry and business.

A Convention Critique

Conventions are indeed an important channel of horizontal communications. But they are not automatic. They continue only as long as they inform and stimulate the conferees. Conventions will always be suspect in the narrow view. It behooves each of us to work seriously to make the best use of the people and talents in attendance. It is in this effort that the editors offer these observations on some of the ideas, trends and a few of the problems of Western conventions.

Some Observations

1. Timing of meetings continues to be a problem. It takes many forms. Overlapping meetings makes it necessary for some to skip meetings they would otherwise attend. Another drawback is that overlapping makes it difficult for top industry speakers to attend both meetings.

2. Most of the Western associations have enforced the "no hospitality during meetings" rule with splendid effect on attendance.

3. There is a growing and valuable trend toward sharing speakers between associations and rendering association representatives to other meetings. Reports indicate these trips of particular value.

4. Some companies still send only those representatives who are giving papers, or appropriate managers. Thus, at one meeting a valuable communications program was hampered because fewer than half of the companies had a communications man present. The "who's-giving-a-paper" criteria also tend to inflate the programs with numbers of papers—and dilute the chance of one's hearing the really great ones.

5. At the Western Joint Computer Conference R. M. Bennett, IBM chairman, said "where we felt we needed a paper on a given subject we went out and looked for it." Thus the 1960 Computer Conference had about half the papers presented in 1959. Half of the papers submitted were rejected. The yardstick of quality, not quantity, seems to be needed. Regional associations are particularly vulnerable to attacks when program quality deteriorates.

6. Some meetings are conspicuously management attendance poor. There are few equal opportunities to see how well some of the junior members of the industry perform. Few of those in attendance view working conventions as paid vacations. A sincere statement (by attending some sessions) by management would make these meetings even more productive. Management is making an investment in conventions and should be on hand to view the proceedings critically.

7. The technique of having a paper prepared on a controversial subject with a subsequent discussion worked particularly well at NELPA E & O. The paper gives a factual basis for future questions and discussions that does not exist in many "round tables."

All your kitchen appliances will be clean, cool electric appliances in a Medallion Home

An all-electric kitchen is just one of the advantages you'll find in a home bearing the Medallion Home award

Every Medallion Home guarantees you:

1. An all-electric kitchen, with major electric appliances such as a modern range and oven ... all part of the basic home plan and price.

2. Full Housepower wiring for present, and future needs to handle the appliances you own today *plus* those you'll want tomorrow.

3. Provisions for proper lighting in all areas where it's needed to insure your family's safety and comfort.

And, for the ultimate in luxury living, there's the **all-electric** home—the Gold Medallion Home with a modern electric heating system such as the amazing electric heat pump that both heats *and* cools.

Always remember ... look for the Medallion award before you buy *any* new home.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY

People

Brunzell

Robinson

Brunzell Succeeds Robinson as WWP President

Kinsey M. Robinson, president of Washington Water Power Co. since 1938, retired May 13 as president of the utility but retained the position of board chairman and chief executive officer.

George M. Brunzell, executive vice-president, was promoted to the presidency.

Robinson, widely known as a spokesman for the private power industry in the Pacific Northwest, began his career in the power business in 1911 as a lineman for the Idaho-Oregon Power & Light Co. He was a foreman when the company was absorbed by Idaho Power Co. in 1916.

He was transferred to Boise in 1929 and became assistant general manager in 1931. Two years later he was named vice-president and general manager and in 1934 he became president of Idaho Power at the age of 38. He resigned this post in 1938 to become president of WWP. Under Robinson's leadership, WWP won the industry's Coffin award three times, and more than doubled generating capability.

Brunzell started with WWP as an electrician at Pullman, Wash., after being graduated from the University of Idaho. He was named division engineer for the Big Bend Division of WWP in 1939 and later served as division engineer of the Coeur d'Alene Division. In 1943 he was transferred to Spokane as assistant superintendent of the Spokane Division and in 1946 was made division superintendent.

He became Spokane division manager in 1955 and the following year was named vice-president and assistant to the president. He became executive vice-president in 1958.

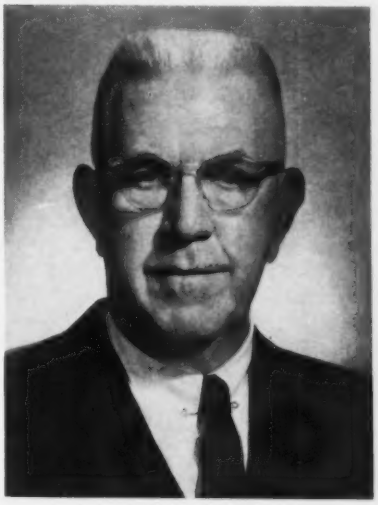
► **E. G. Nielsen** of Denver has been appointed to succeed **W. S. Gookin** of Phoenix as administrator of the Arizona Power Authority. Gookin resigned in March to serve as consulting engineer for the combined Arizona Power Authority and Interstate Stream Commission. Nielsen, who took over duties on May 9, is with a Denver consulting engineering firm and for years was in the project planning division of the U. S. Bureau of Reclamation.

► **J. E. Cushman,** vice-president in charge of commercial and business development for Utah Power & Light Co., and **T. C. Woodside,** vice-president and treasurer, were elected to the company's board of directors. They fill vacancies created by the death of George Gadsby and James E. Graham.

► **Glenn L. Jackson,** vice-president of California Oregon Power Co., has been appointed to a full three-year term on the Oregon State Highway Commission. He was originally appointed last year to complete an unexpired term.

► Expanding its activities in the Western region Ebasco has appointed **Larry J. Aubrecht** as director of management consulting services. He will direct the resident staff of management consultants headquartered in San Francisco. The San Francisco office is headed by **H. K. Breckenridge.** With Ebasco since 1954, Aubrecht has been general management consultant on the New York staff.

► **Joseph C. Purcell** has been made industry coordinator for PG and E's residential sales department. He will assist in the field administration of promotional activities and in maintaining contacts with appliance industry associates, according to **John S. C. Ross,** residential sales manager.



McLaughlin

McLaughlin Retires

Frank McLaughlin has retired as chairman of the board of Puget Sound Power & Light Co., a position he has held since his retirement from the presidency last September. He will continue as a director of the company as well as an adviser and consultant.

His position as board chairman will not be filled, according to J. H. Clawson, company president.

McLaughlin, who was Puget Power's president for 28 years, started his career with Stone & Webster in 1912 as a messenger. He remains active in civic affairs. He is chairman of the King County Science Fair and will continue his work in Junior Achievement and in efforts promoting higher education.

A luncheon honoring him on May 12 at the Olympic Hotel was attended by more than 700.

Changes at San Diego G&E

Appointment of Howard Wylie to the newly created post of superintendent-district operations has been announced by San Diego Gas & Electric Co. Before his appointment, Wylie was district operating supervisor, stationed in the Eastern District operating headquarters at El Cajon. His post will be taken by R. L. Tilford Jr.

Other recent changes reported by San Diego Gas & Electric: Richard Farwell was made manager of the Orange County District, succeeding Otis L. Pemberton, who was transferred to the Chula Vista District as manager.

Lloyd Wall was promoted to a new position of district offices director, in which he will supervise commercial operations in eight districts. Kenneth M. Brown was transferred from Chula Vista as manager of the Eastern District to succeed him.

► **George S. Madison** has been named California sales representative for the Bermico Division of Brown Co., manufacturer of bituminous fiber pipe and conduit. Madison has been in the Portland area since 1946. His new headquarters will be in Los Angeles.

► **William L. Nehrenz** has been elected vice-president of Eldon Industries Inc. of Los Angeles. He will continue as general manager of Ungar Electric Tools of Venice, Calif., a division of Eldon.

► **E. E. Ferrey** has been appointed director of public relations for **Hoffman Electronics** Corp. He formerly was with Lenkurt Electric Co. of San Carlos, Calif., where he served as public relations director.

► **Grant E. Syphers** of Arcadia has been appointed assistant director of the state PUC's southern California area. A native of Ogden, Utah, he has been with the commission since 1947.

► **Robert A. Mitchell** has been promoted from Portland distribution engineer for Pacific Power & Light Co. to assistant district power superintendent for the company's Willamette Valley-Coos Bay power district.

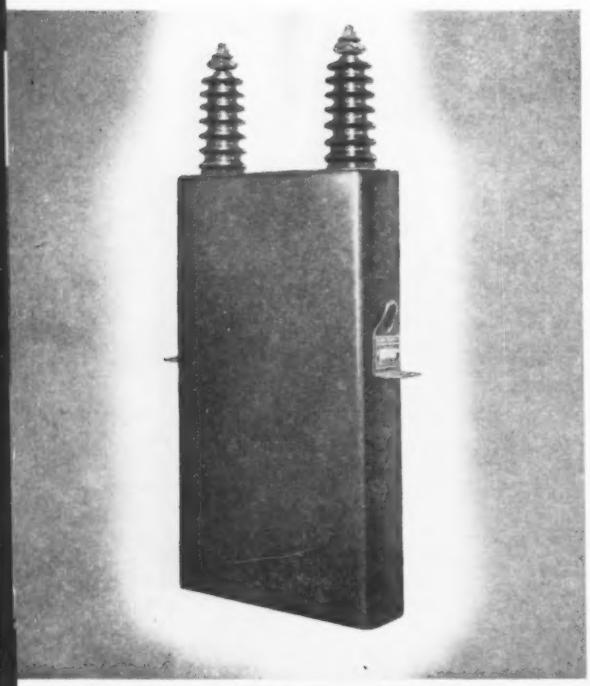
► **H. P. Forman** has been elected vice-president, public relations, for Puget Sound Power & Light Co. Forman joined Puget in 1955 as assistant to the president and in 1959 was named public relations director. After being graduated from Harvard in 1934, he worked as a newspaper reporter before moving into the advertising and sales promotion field with the Crowell Publishing Co. He spent the next 10 years with the Western Electric Co. and subsequently joined the New York Telephone Co. where, in 1948, he was named information manager.

Forman

► **Steve C. Mulle** has been made manager of the Westinghouse apparatus sales office at Van Nuys, replacing **Arthur G. Kane Jr.**

► **Leonard J. Sacks** has been made Western district sales manager for G-E's Silicone Products Department with headquarters at Downey, Calif.

G-E "COMPACT ISOKRAFT* 50" CAPACITORS OFFER



900 KVARS AT

General Electric's new "COMPACT ISOKRAFT 50" capacitor represents the lightest and most compact 50-kvar unit available. And because of these benefits, higher rated, lighter capacitor equipments can be installed in locations where weight and size are limiting factors.

Single-row capacitor equipments offer the cumulative weight reduction of these new, 4-inch-thick, 82-pound, 50-kvar units. They weigh less and, installed, have less extension beyond the pole. Easier, less expensive installation and improved appearance on the pole result.

"COMPACT ISOKRAFT 50" capacitors help make available a 900-kvar single-row equipment that weighs less than the first 600-kvar equipment introduced in 1956. And the 900 kvars fit into an

*Trademark of General Electric Co.

► **Dr. F. P. Bowman** has been appointed medical director for Southern California Edison Co., succeeding **Dr. W. F. McCool,** who retired after 34 years of service. Dr. Bowman joined the Edison company as an assistant surgeon in December 1949.

► **Garland C. Ladd,** formerly director of public relations for Atomic International, has been appointed assistant to the division president, public relations.

► **Paul L. White** has been appointed hydroelectric superintendent for Sacramento Municipal Utility District's upper American River project and will be in charge of the maintenance organization required to run the plant. A registered electrical engineer and a graduate of UC, White has been with SMUD since 1951.

White

Lineman Joe Croman, Seattle City Light, receives a plaque for heroic action from Supt. Paul J. Raver; F. John Albi, safety supervisor, looks on. Croman was burned in an attempt to save the life of a fellow worker when an oil-filled cutout switch exploded

► **J. Harvey Wilson** has retired as superintendent of Calgary's electric system and city electrical engineer. He has been succeeded by **Albert A. Bishop,** formerly assistant superintendent, who joined the system in April 1946 as electrical engineer.

► Appointment of **Cleo E. Thomas** as assistant to the president of California Electric Power Co. has been announced by President Carl C. Ernst. Thomas will retain his position as Calectric assistant secretary, which he has held since 1953. Associated with the company for more than 30 years, he has held posts in the engineering and commercial departments and has served as credit manager, assistant treasurer and traveling auditor.

► **John E. Pingle,** Oregon Steel Mills, was recently named president of the Electrical Maintenance Engineers Assn. of the Columbia Basin. Other new officers are **James S. Poage,** General Electric Co., vice-president; and **Naylor E. Cole,** Pacific Power & Light Co., secretary-treasurer. Pingle succeeds **Fred Bunnell** as president.

600-KVAR WEIGHT

equipment that extends only 5 inches more beyond the pole than a 600-kvar equipment with superseded 50-kvar units.

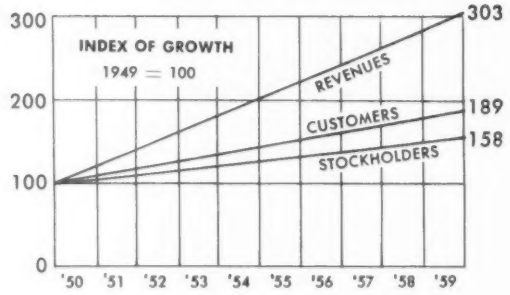
And further reducing costs, self-protecting aluminum racks and corrosion-resistant stainless-steel capacitor cases eliminate the need for periodic protective paint maintenance.

For more complete information contact your General Electric Apparatus Sales Representative, or write for Bulletin GEA-7061, General Electric Co., Section 445-32, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

In San Diego...We Spell Growth with a capital "G"



* . . . from page 7

"Gross revenues increased 19.3 per cent over the previous year. Net income more than kept pace, increasing 33.4 per cent. And earnings available for common stock were the highest in company history."

* . . . from page 3

"The increase in number of customers during 1959, both gas and electric, set a new record exceeding by about 25 per cent the previous record made during 1958. Building construction activity in San Diego was extremely high, and was exceeded nationally only by New York, Los Angeles, Chicago and Houston . . . cities with populations much larger than San Diego."

* . . . from page 12

"During the year 1959, there was a notable gain in the number of common stockholders. At the beginning of 1959, there were 19,711 record holders of this class of stock, which number increased to 22,850 at the year-end, a net gain of 3,139 accounts."

* Excerpts from our 1959 ANNUAL REPORT TO STOCKHOLDERS . . . a copy is yours for the asking . . . just address your request to . . .

SAN DIEGO GAS & ELECTRIC COMPANY

P.O. Box 1831 — San Diego 12, California

INVESTOR OWNED AND LOCALLY MANAGED

The advertisement above appeared in the April 25, 1960 edition of FINANCIAL WORLD and in BARRON'S on April 27, 1960.

► A recent staff change reported by B. C. Electric was the appointment of **R. M. Bibbs** as administration manager of the electrical division.

► **Robert A. Harris** has been named regional engineer for the Bureau of Reclamation with headquarters at Boise. He succeeds **D. S. Walter,** who is retiring. Harris started with the bureau in 1935 and joined the regional office at Boise in 1944.

► Prominent among the retirees of Southern California Edison Co. recently have been **George R. Cooper,** local manager at Glendora, who retired March 1 after 34 years of service; **M. A. Voisinet,** district manager at Covina, who retired after 43 years' service; and **A. Jenkins,** supervising substations engineer, who retired March 1 after 31 years of service.

► In a realignment of its regional sales structure, RCA has appointed **Harold R. Maag** staff vice-president, Western distributor and commercial relations, with headquarters in Hollywood. He had been vice-president and Western regional manager.

► **William L. Sheets,** formerly manager of the Los Angeles office of Stone & Webster and general superintendent of construction in the Western states, has been named senior construction manager. In his new post, he will be responsible for administrative direction of all Stone & Webster construction department activities, according to President Fred Argue. Sheets moved to Los Angeles in 1946 where he was construction superintendent and later project manager on Edison power plants and transmission lines. He has been with Stone & Webster since 1929.

In recognition of 35 years of service Walter J. Maytham, Westinghouse vice-president and Pacific Coast manager, was awarded cuff links by President Mark W. Cresap

. . . by more contractors than any other portable cord

The cord that clicks with contractors is ROYAL . . . and the reasons are many. Made to high standards of quality, and controlled every step of the way under one roof, Royal cords offer the quality characteristics that you look for most in your work — flexibility, durability and dependability.

Royal offers the most complete range of types and sizes, too, through your electrical wholesaler; one recognized and respected name on all your flexible cord — Rubber, Neoprene and Plastic Jacketed Portable Cords, Thermostat Cable, Lamp and Fixture Wires, Machine Tool Wires, and heavy duty "POWR-KORD" extensions.

Next time you order cords, specify ROYAL.

Royal Electric Corporation
Pawtucket, Rhode Island

ROYAL ELECTRIC ...an associate of

SALES REPRESENTATIVES AND WAREHOUSES: Los Angeles—1950 Naomi Avenue, RI 7-9655; **San Francisco**—1225 Sixth St., HE 1-5792; **Seattle**—4130 First Ave., So., MA 3-8882; **Denver**—888 S. Lipan Street, WE 6-3456

NEW Truco TURRET DERRICK
GIVES 3-DIMENSIONAL CONTROL
Safe
Simple to operate
Cuts Cost,
saves man hours
Compact,
folds quickly within
length of truck
Versatile
With Truco digger attachment, derrick can dig the hole, set the pole.
With Truco fiberglass basket, unit becomes an aerial lift.
Handles 90-ft. pole or heavy transformer
Jack legs for stability
Truco AERIAL LADDER
Truco CABLE REEL CARRIER
Truco AERIAL LIFT
Truco HYDRAULIC DERRICK
Write or phone for full details
Truco
Ask for name of nearest distributor
TRUCK Equipment COMPANY
3963 WALNUT ST. • AComa 2-7905 • DENVER 5, COLORADO

► **H. Douglas Sutcliffe** has been added to the board of the Peace River Power Development Co., bringing the directorate to 19. Sutcliffe is general manager of Western Development & Power Ltd., a subsidiary of the B. C. Power Corp. and a sister company of BCE.

► **Whitman Ridgway,** former manager of the electric utility sales in the San Francisco office of G-E's Apparatus Sales Division, has been made manager of marketing-gas turbine department, succeeding **Clement E. Sutton Jr.** Ridgway joined the large steam turbine-generator department in December 1959. Before that move he had been in San Francisco since November 1954.

►**Everett B. Gibbons,** who has been serving as manager of Grant County PUD since the resignation of Glenn A. Smothers last August, has been put in full charge of both distribution and production facilities. Gibbons had been in charge of distribution facilities and **Robert R. Ries,** formerly chief engineer, had been in charge of production facilities. The action, taken by PUD commissioners to centralize administrative responsibility in the district, leaves Ries' duties unchanged but makes him responsible to the manager instead of the commissioners.

► **Stewart H. Butler** has joined Pacific Power & Light Co. in the personnel department. He formerly was personnel manager for the Blue Mountain Division of Green Giant Co.

► **H. Malcolm Ogle,** development projects consultant for G-E's Atomic Power Equipment Department at San Jose, has been issued his 24th U. S. patent. It is for a magnetic frequency converter, which he developed while he was with the General Engineering Laboratory in Schenectady.

► **Fred Martinson,** until recently an electrical engineer for Stevens & Thompson, Portland, consulting engineers, has joined the staff of Mears Electric Circuit Breakers Inc.

► Two members of the Pacific Gas and Electric Co. organization have been raised to the grade of Fellow, AIEE. **Arthur J. Swank,** vice-president in charge of electric operations, was honored for contributions to construction and operation of a large power system. **Cornelius C. Whelchel Jr.,** chief mechanical engineer, was given the honor for

his contributions to design of large steam turbines and power plants and evolution of practical nuclear generation.

► **Jean V. Kresser,** senior engineer for Westinghouse Electric Corp Pacific Coast Region at San Francisco, has been made a Fellow of the AIEE. He was honored for his contributions to the design, control and literature of electric power apparatus.

Deaths

Lewis A. Lewis, 78, former assistant general manager of Washington Water Power Co., died at his home in La Jolla, Calif. He joined the utility in 1908 after being graduated from Washington State University. Starting as an electrical engineer, he was named sales manager in 1917 and assistant general manager in 1929. He retired in 1947.

Verne N. Kent, 69, Tacoma City Light superintendent from 1933 to 1945, died May 6. An electrical engineer, he joined the utility in 1917 and retired in 1956.

Lester E. O'Brien, 64, retired Bonneville Power Administration electrical engineer, died recently.

Albert E. Bush, founder of the Bush Electric Co. of San Francisco and pioneer in the X-ray equipment manufacturing field, died May 4 at Redwood City, age 73.

Sidney F. Ricketts, 77, head of Ricketts, Sewell Electric Co., Vancouver, B. C., died in that city. Leaving London in 1903, he worked as an electrical engineer in south China until the Chinese revolution in 1911. He moved to Vancouver in 1925 and started business as an electrical engineer.

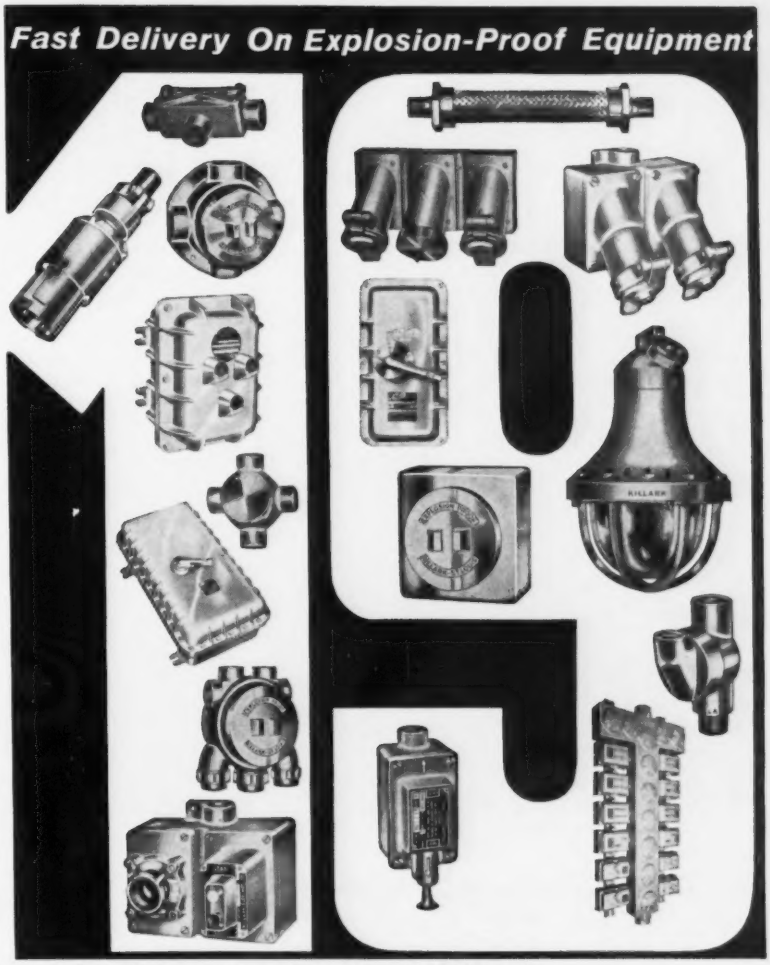
Eldred M. Royle, past president of Intermountain Electrical Assn. and former radio and electrical dealer in Salt Lake City, died, age 56. He also served in the state legislature and was prominent in civic and electrical industry affairs.

Joseph J. McTeigh, former electrical inspector in Oakland from 1915 to 1947, died Jan. 1, age 76.

Ray Hankins, formerly with Sechrist Mfg. Co., Denver, died Dec. 20 in Phoenix, following an extended illness.

Ray C. Lorigan, a 35-year veteran with Pacific Gas and Electric Co., died of a heart attack at age 60. He had been supervisor of PG and E's San Francisco service division since 1954.

Norman Lyman, 40, general superintendent of Hilo Electric Light Co., died suddenly last month.



...nineteen convenient Killark warehouses deliver explosion-proof fittings and fixtures promptly!

Regardless of where you are located in the United States or Canada, there's a Killark warehouse nearby with a complete line of aluminum explosion-proof electrical fittings and fixtures, U.L. or C.S.A. approved. Your Killark wholesaler probably has the item you need in stock or can get it for you quickly because his stock is backed up by nearby factory warehouse stocks in nineteen locations to assure you fast delivery.

KILLARK REPRESENTATIVES & WAREHOUSE STOCKS

*DENVER—Kenneth B. Schumann Co., 1073 Galapago St., Denver 4, Colo.
HONOLULU—Matt Cabot & Associates, P. O. Box 3708, Honolulu 11, Hawaii
*LOS ANGELES—Kenneth Anderson Co., 123 S. Myers St., Los Angeles 33, Calif.
*PHOENIX—Kenneth Anderson Company, c/o Melvin C. Long, 422 S. 7th Ave., Phoenix, Arizona
*SAN FRANCISCO—F. M. Nicholas Co., 714 Harrison St., San Francisco, Calif.
*SEATTLE—Northwestern Agencies, Inc., 4130 First Ave., South, Seattle 4, Wash.

*Warehouse Stocks
6008

Killark
ELECTRIC MANUFACTURING CO.
Vandeventer and Easton Aves. • St. Louis 13, Mo.

New G&W "Off-the-shelf" shipping system

means faster deliveries; reduced installation costs on potheads and oil fuse cutouts!

Orders received in the morning at G&W are often on their way to you the same afternoon. There's no time wasted in getting standard G&W Capnut and Sodertite Potheads and Oil Fuse Cutouts you need to meet most installation requirements.

G&W's new "Off-the-shelf" shipping system is unique and fast. Components of given assemblies are gathered from stock, checked, crated, and sent on their way. When you receive equipment in component form, your installation costs are minimized because you avoid needless disassembly time before the unit is installed.

This new shipping system is typical of improvements being made in G&W services. It is another example of why it pays you to rely on the acceptance, dependability, and quality standards that have made G&W specialists in the electric-power market. There is a pride of craftmanship in every product produced and attention given to detail is unexcelled in the industry. Thorough and precise workmanship means all the difference between years of trouble-free operation and the irritating and costly failures caused by inferior design and poor quality.

Look to G&W for all your cable accessory and switching needs. Contact a G&W Representative to answer your questions; or write us for full information.

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CANADIAN MFG. • POWERLITE DEVICES LTD. • TORONTO, MONTREAL & VANCOUVER

superior quality standards — inspired specialized design

For phone number of closest representative see advertising index in back of book.

Manufacturers—Distributors

► **Andrew C. Blundell,** Maydwell & Hartzell's southern California regional manager, was made a vice-president of the firm. Expansion necessitated appointment of an executive officer with headquarters in Los Angeles, company officials said, and Blundell's "long and faithful service qualified him for the promotion." Graduated from the University of Nebraska with a BS in electrical engineering, he was in the electrical utility business before he joined M&H. Except for a tour of duty with the Air Force during World War II, he has been with the firm since 1938. Los Angeles headquarters are at 427 W. Fifth St.

Blundell

► **H. B. Sherman Mfg.** Co. has appointed as its agent for the New Mexico-Arizona area **D. J. Mackey & Associates,** P. O. Box 988, Albuquerque.

► **Inland Glass Works,** maker of heatproof glass, has appointed **Guy de Leuze** of San Francisco to represent its lighting ware products in northern California and Nevada. The **Bruce-Emmett** Co., with offices in Portland, Seattle, Spokane and Salt Lake, will handle the line in the four-state area.

► A realignment of marketing personnel has been announced by **G-E's** meter department. Watt-hour meter and instrument transformer sales, previously separate units, have been unified under two regional sales managers. William S. Smith and Kenneth T. McEntire have been made regional electric utility sales managers in the new organization. James N. Thompson will manage the resale operation.

► **Murphy-Hain** Co., manufacturers' representative, has moved from 2133 Bay St. to 333 S. Mission Road, Los Angeles 33, in the heart of the electrical wholesale area.

► **Richard A. Strassner** Co. has moved its northern California branch office to new quarters at 126 Third St., Los Altos, Calif. Merrill Holt, branch manager, and Philip Halinger, sales engineer, are working out of the new office.

► **Tri-State Supply** Corp. of Seattle has moved to its new headquarters at 325 Westlake Ave. N., Wayne C. Groshart, vice-president and general manager, reports. The company had been located on Occidental Ave. for 16 years.

► **Wesco's** northern California district has opened a new apparatus and supply center in Concord, Calif., at 830 Diamond Way. Administrative functions will continue to be handled by the Oakland office, with W. Karl Ostler as manager.

► **W. J. Burke** Co., Los Angeles, has been appointed distributor for Pacific Mercury electric plants. The firm will stock representative models of the plants and will maintain a complete parts and service department.

► **G-E** has announced a new service to augment its instrument rental program, administered through company service shops. Under the program, skilled technicians can be hired to measure and record virtually any quantity or combination of quantities, it is stated. Organizations with specialized measurement jobs can secure the service on a per diem basis.

► **Anaconda** has opened a district sales office in Phoenix to serve the state of Arizona. D. Owen "Nick" Nicholson, formerly sales representative at Los Angeles, will be district manager at Phoenix, with headquarters in the Central Towers Bldg. He will handle sales of Sequoia wire and cable as well as operations of the parent, Anaconda.

► **I-T-E** opened a sales office in Phoenix May 1, replacing Central Station Equipment Co. of Tucson, formerly its agent in the area. The new office, located in Central Towers, will also handle Kelman Division products, formerly under W. H. Eddy Electric Products Inc. Ernest Thompson, with the company for 12 years, has been named Phoenix manager. Before joining I-T-E, he was a sales engineer for the Clark Controller Co. and Electric Controller Mfg. Co.

Thompson

When you select a size and grade of strand for a specific job you want to know that it meets every requirement of that job. You want ample strength to sustain the ultimate load—plus an adequate safety factor. You want pliability for ease of working in the field. You want ruggedness to withstand the abuse which may be encountered during and after installation. You want long, dependable life. And, you want reasonably low first cost and low maintenance costs.

For more than 50 years *Crapo* Galvanized Steel Strand has consistently demonstrated its ability to more than meet all of these requirements. Proof of its reliable performance is to be found in the case histories of overhead power and communication lines throughout the country.

Crapo Galvanized Steel Strand is fully protected against corrosion by heavy, uniform, dense coatings of commercially pure zinc tightly bonded to the individual wires. All grades and sizes are available in A, B and C weights of coating.

For details, ask our distributor or write direct!

INDIANA
STEEL & WIRE
COMPANY, INC.
Muncie, Indiana

MOLONEY DISTRIBUTION TRANSFORMERS ARE DESIGNED TO MEET ALL SYSTEM REQUIREMENTS

Comparative analysis of distribution transformers invariably leads to one conclusion . . . the best distribution transformer has all characteristics of design carefully developed in respect to their contribution to system efficiency, dependability and economy.

In Moloney Distribution Transformers, no one feature, electrical or mechanical, is radically improved at the expense of another. Instead, each part of the design is carefully considered and balanced with the others, to provide a distribution transformer that will give the best all-around system performance.

Utility systems benefit from this philosophy of design because every Moloney Distribution Transformer feature is designed to perform in the best possible manner compatible with every other aspect of the design, and thus provide "More Power To You."

Desirable Features of Moloney Distribution Transformers Include . . .

High Short Circuit Strength	Corrosion Resistant
Mechanical Strength	AL-CU Connectors
Weatherproof	No Radio Interference

Here Is How They Are Achieved.

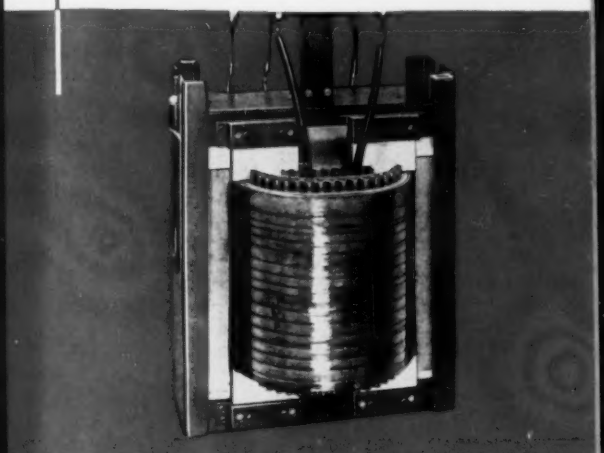
SUPERIOR PERFORMANCE BECAUSE...

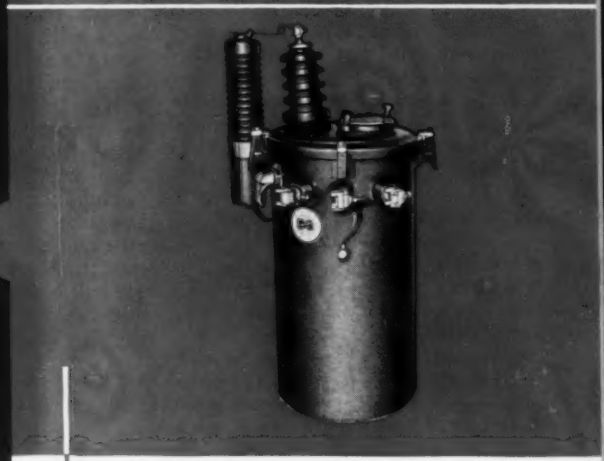
MOLONEY ELECTRIC CO.

Since 1896 . . . ***MORE POWER TO YOU***

1 High Short Circuit Strength

All turns are anchored into position and resin-coated layer insulation is used throughout the coil. During the coil drying process this resin bonds the adjacent paper and wire together but does not keep the oil from penetrating all insulation. Steel frames secure wood blocks which press against the stayback on both top and bottom of the coil to hold it rigidly in position.





4 Corrosion Resistant

All materials used for Moloney tanks and accessories are especially selected for their resistance to corrosion and the tank, cover and base are painted with a tough, flexible weather resistant paint. The tank and cover are of heavy gauge metal and all connectors, clamps and other hardware are made of alloys which are relatively impervious to weather. All bushing mounting hardware is located internally, thus removing several possible sources of corrosion.

SALES OFFICES IN ALL

2

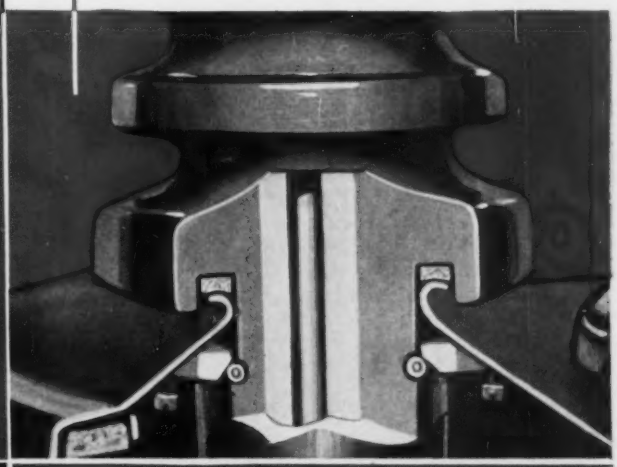
AL-CU Connectors

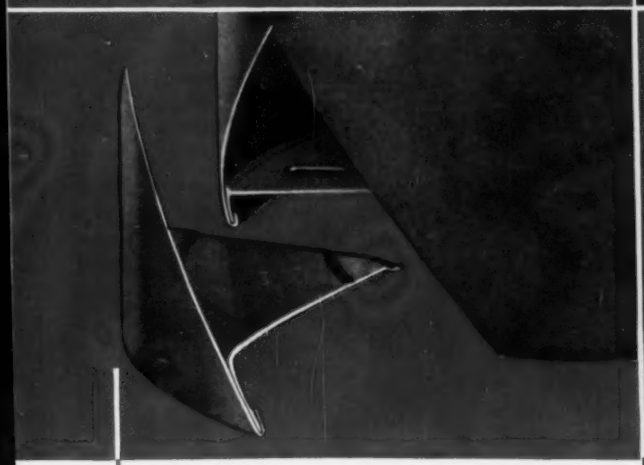
The solderless connectors are electro-tin coated and are designed to accommodate either the copper conductors specified by EEI-NEMA Standards or the ACSR equivalent. The large contact surface reduces conductor cold flow and the double-coil, spring-type washer compensates for any cold flow which may occur. Connectors are made of silicon bronze alloy to prevent twisting or breaking.

3

No Radio Interference

On voltages up to 15 KV the high voltage bushing boss is rolled to prevent the formation of corona at the point where the bushing passes through the cover. At higher voltages a conductive glaze and mounting adapter is combined with the rolled boss to prevent corona. These practices render Moloney Transformers free from potential sources of radio interference.





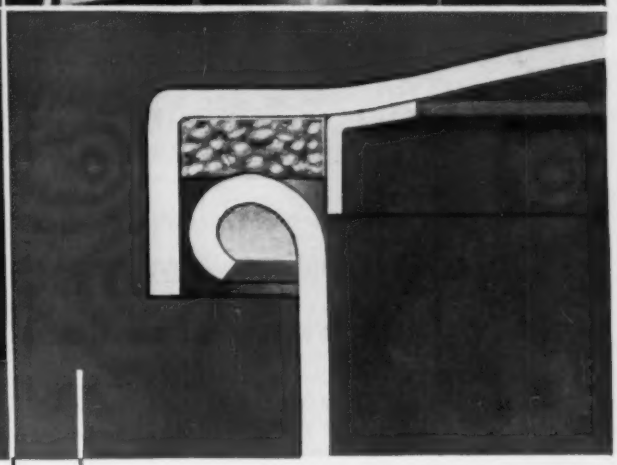
5

Mechanical Strength

The tank, cover, bushings and other components are designed to resist damage in shipment, handling or installation.

The metal used in the tank and cover is heavy gauge, copper bearing steel formed to give added strength at the points most susceptible to damage, especially at the tank base flange, where there is a triple thickness of metal.

All bushing corrugations have a thick vertical cross section to give the bushing high impact strength.



6

Weatherproof

To assure that the transformer is sealed from the atmosphere and the elements, bushing openings have retained corprene gaskets; cover bushings are mounted on rolled bosses whose flanges curve up and away from the opening; a corprene cover gasket seats on the rolled top rim of the tank and is retained by the rim, cover overhang, and an internal gasket retainer. The cover gasket remains in the cover when cover is removed from the tank and therefore will not stretch out of shape necessitating replacement.

ME60-5

Easy-to-use, fast, safe

JET LINE METHOD

works in any size conduit

SAVE $40.00 PER DAY ON WIRE-PULLING COSTS WITH THESE TOOLS:

Jet Line Power Cylinder — for 1/2", 3/4", 1" conduit
Jet Line Gun — for conduits 1 1/4" to 6"
Jet Line Poly Rope — lightweight, strong, flexible, non-conductor
4727

Proved on the job by contractors everywhere, the Jet Line Method* is by far the fastest means of wiring conduit ever invented.

Ask your wholesaler today for a demonstration . . . see for yourself how you can save time and money with Jet Line. Low-cost Starter Kits available.

*Pat. # 2,930,584

Ask your distributor for details, or write

JET LINE PRODUCTS, INC.

615 FUGATE AVENUE, CHARLOTTE 5, NORTH CAROLINA

► **W. K. Roots** has been named chief engineer by Mears Electric Controls and Mears Electric Circuit Breakers of Portland. He will head up the new product development group in Mears' new office and factory at Beaverton, near Portland. Until recently he was senior design engineer for Federal Pacific Electric Co.

Roots

► **Charles A. Appel,** electrical sales engineer in the Portland branch office of Aluminum Co. of America, has been transferred to Pittsburgh headquarters. According to **L. F. Lafferty,** Portland branch sales manager, Alcoa's electrical product sales are now assigned to Rome Cable Division. **B. L. Rice,** electrical conductor Northwest field advisor since 1955, and **C. K. Shanks** of the former Rome organization are in charge of the operation.

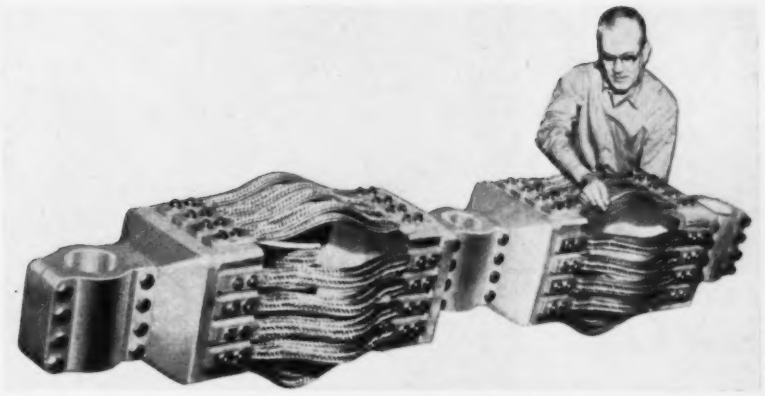
► **Robert W. Tench** has been made Western manager for Virden Lighting Division with responsibility for the States of California, Arizona and Nevada. His office is in the new plant of Virden's subsidiary, Lighting Dynamics, at Los Angeles. With the company for 20 years, he has both sales and manufacturing experience.

► **R. E. Bean,** Graybar's financial manager at Portland since 1956 and formerly in Seattle, has been appointed Wolverine district financial manager.

► **Robert M. Kavish** has been appointed West Coast salesman for G-E's Chemical Materials Department. His headquarters are at San Mateo.

► **Packard Bell Computer** Corp. has signed an agreement with **Bailey Meter** Co. for exclusive application of the former's PB250 general-purpose computer in the control of power plants. Under the agreement both companies will use the new computer in other process industry applications, Max Palevsky, Packard Bell Computer vice-president, said.

► **R. W. Beck,** managing partner and chief engineer of R. W. Beck & Associates, announced at Seattle that **John P. Rossie,** principal design engineer of the firm's Columbus office, has become a partner, with the title of executive engineer.



Largest — This 10,000-amp, flexible neutral connector, largest it has made to date, was shipped recently by Penn-Union Electric Corp. of Erie, Pa., to Allis-Chalmers Mfg. Co. It will connect the neutrals of a steam turbine-generator capable of 282,000 kva at 20,000 v. Generator studs were on 42-in. nominal centers with provision for plus or minus ½-in. movement. The unit is 8 ft long and weighs approximately 700 lb; is made up of three 6-in. silver-plated copper alloy stud connectors joined by 32 double braid connectors

► Increased ratings with normal life expectancy for all Issue E roundwound distribution transformers rated through 75 kva, 2,400 through 8,000 v have been announced by **Line Material.** Ratings of 5, 10, 15 and 25 kva have been increased 20% and ratings of 37½, 50 and 75 kva have been increased 12%.

► **General Electric's** San Jose motor plant recently made its largest single shipment when it sent 15 motors weighing 7,500 lb each to the Mexican government to drive propeller pumps in the Mexico City drainage system.

► In a booklet entitled "Partners in Progress," **Federal Pacific Electric** Co. details its new distributor policy. The policy features a selective distribution program in which the company will sell in each trading area through the smallest number of qualified wholesalers necessary to provide coverage. Under an inventory control plan, the company agrees to take back from wholesalers current but slow moving products in exchange for an order of equal value for items expected to move more rapidly in a given trade area.

► A recent fire caused an estimated $150,000 damage to **Nu-Lite Fluorescent** Mfg. Co. at Los Angeles. About two-thirds of the plant was gutted and the stock of lighting equipment was termed "almost total loss."

► **Globe Illumination** Co., maker of commercial and industrial fluorescent lighting fixtures, opened a new show room at 2508 W. Sixth St., Los Angeles.

► **California Electric Supply** Co., San Francisco, elected new directors as follows: Lloyd B. McDonnell, president; Barry McDonnell, vice-president and treasurer; Sol Cohn, vice-president in charge of commercial lighting; Richard Reese Jr., vice-president of operations; Edward J. Rising, vice-president, major appliances; D. Chick Vatuone, vice-president, electric supplies; and Ben Biesbroeck, comptroller.

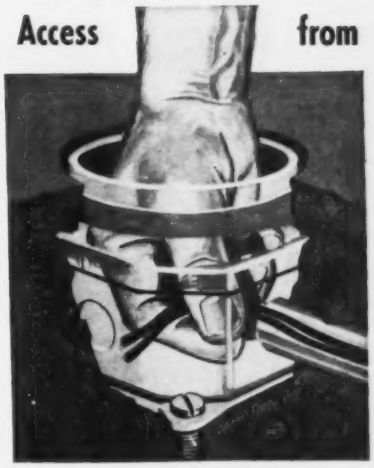
► **Thomas & Betts** has announced appointment of I. W. Strong as manufacturers' representative for the States of Colorado, Wyoming and eastern Montana. Strong has been active in the electrical field since 1940 and has served in various capacities with Appleton Electric Co.

Strong

► **Maxwell L. Stoughton** has been named apparatus engineer for Kelman Power Circuit Breaker Division of I-T-E. He will work out of the Los Angeles division to promote sale of power circuit breakers nationally.

► **F. J. Balzer** has been appointed sales manager of **Rockbestos Wire & Cable** Co.'s Northwest territory. He can be reached through the company's Burlingame, Calif., warehouse at 6 Guittard Road.

Complete HAND Access from



TOP of CONCRETE to bottom of BOX

This #190 "Tru-Level" series is a standard 4 inch octagon, sheet steel box, developed for concrete or tile floors, also wooden floors with concrete base.

A threaded brass adjusting-ring permitting ½ inch height adjustment, in addition to three screw legs 2½ inches long, make for quick and easy tru-leveling.

Conduit attachment or wire-pulling is easy even when concrete is poured to very top of box. The 3¼ inch opening in the box-body permits whole hand access from top of concrete to bottom of floor box.

Designed to fit all popular size and style receptacles—simply clip off plaster ears and drop into place.

Listed under re-examination services of Underwriters Laboratories, Inc.

284-S

COMPLETE LINE OF ACCESSORIES

Telephone Nozzles, Duplex Receptacle Nozzles, Combination Abandon Plugs, Receptacles.

The 284-S Duplex Receptacle Nozzle comes with ½" brass pipe extension or can be furnished with 3/4" pipe.

Sales Representatives in all principal Cities:

PAYNE & SLOAN
1101 East 5th St. Los Angeles 13, Calif.

L. F. CHURCH COMPANY
750 Natoma Street San Francisco 3, Calif.

HARVEY M. OLMSTEAD COMPANY
PO Box 5512 T.A. Denver 17, Colo.

WIANT PRODUCTS COMPANY
1231 N. W. Hoyt St. Portland 9, Ore.

R. C. ENGLISH & ASSOCIATES
4229 122nd, S. E. Bellevue, Wash.

SOLD ONLY THRU WHOLESALERS

Fullman MANUFACTURING COMPANY
1209-1215 JEFFERSON ST.
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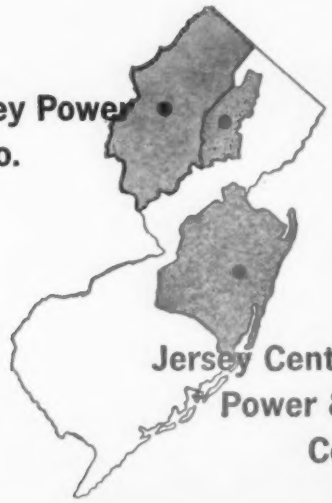
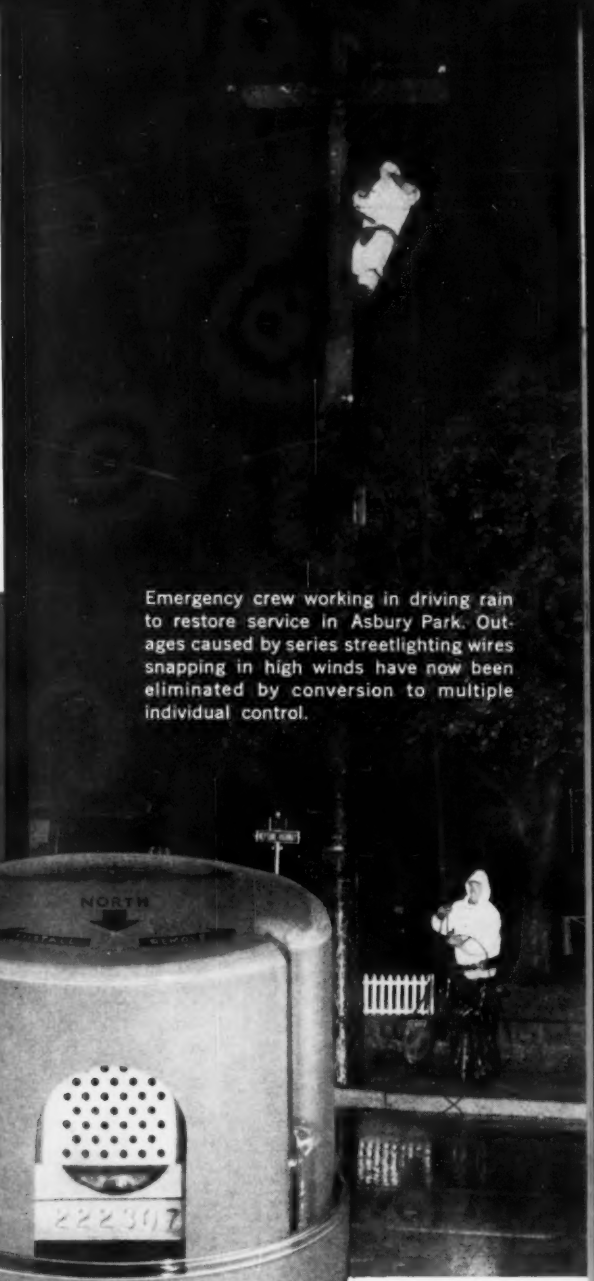




Emergency crew working in driving rain to restore service in Asbury Park. Outages caused by series streetlighting wires snapping in high winds have now been eliminated by conversion to multiple individual control.

Two Progressive Utilities Reduce Storm Outages with F-P Individual-Lamp Controls

Conversion by Jersey Central Power & Light Co. and New Jersey Power & Light Co. from series to multiple individual photoelectric streetlight controls, many of them Fisher-Pierce Series 6600A units, has eliminated some tough problems brought on by severe weather. Since 1954 New Jersey has experienced a succession of hurricanes (that year there were three in six weeks) and unusually fierce winter storms, which caused series wires to snap in high winds and under the weight of ice. Other lines were being shorted by these broken wires, or had to be cut for safety when repairing the streetlight wires. The result was many service interruptions and plenty of headaches. Individual controls—and elimination of the series wire — provided the answer.

In 1957 these utilities embarked on a progressive relighting and conversion program that has reached completion in certain areas. Every street in Asbury Park, for example, conforms to IES lighting standards, and every lamp is individually controlled. Because poles have been cleared of several hot elements, pole work is simplified. And the danger of fires from high voltage leaks due to broken series wires — a particular problem where there is damp, salty air — has also been eliminated.

Down with the old... Up with the new...

New, brighter streetlight equipped with Fisher-Pierce Series 6600A control replaces series streetlight as part of JCP&L and NJP&L conversion program. Short time delay in the F-P control permits fast checking and effectively prevents false turn-off by lightning – no cases have been reported to these utilities. All streetlights in Asbury Park (below) are individually controlled.

For complete design information and specifications on Series 6600A controls, write The Fisher-Pierce Co., 43 Pearl Street, So. Braintree 85, Massachusetts.

FP

FISHER PIERCE

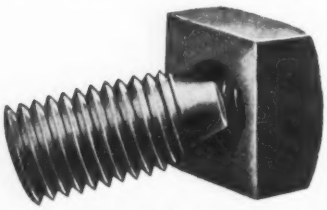
PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

DEPENDABLE POLE LINE CONSTRUCTION *DEMANDS*

Cross Arm Braces

"HANDIDRIVE" Pole Steps



Handipoint **Bolts and Rods**

High Tensile Bolt Guy Clamps

Manufactured and Stocked For Your Convenience On The Pacific Coast

KORTICK

MANUFACTURING COMPANY

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SALES OFFICES & WAREHOUSE STOCKS AT

Maydwell & Hartzell, Inc.

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NATIONAL ELECTRIC SUPPLY CO.
HONOLULU, HAWAII

AF Makes Staff Changes

Organization changes and new appointments in the machinery and electrical department of American Factors at Honolulu have been announced by Manager Daniel F. Flinn. John J. Richardson has been named administrative assistant to the general manager, and Robert A. Plaus consultant to the general manager with responsibilities for market development and special advisory assignments.

Four operating sections with primary product responsibility and manufacturers' representation have been created. They are: apparatus, construction, lamp and lighting fixture products, managed respectively by Wallace D. Glaser, Donald L. Thomas, Walter S. Craver and Horace W. Myers.

Glaser will also manage the new Marketing Section. The section's director of merchandising and manager of sales promotion activities will be Luther E. Stone.

► **G-E's medium transformer department** has announced a handbook price reduction effective May 2. The reduction represents a drop of approximately 5% from the prices issued April 11 and covers transformer kva sizes 2,000 through 7,500.

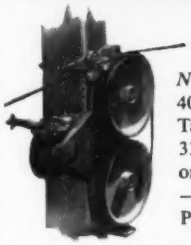
► **James Addcox** has been named district sales manager for Arvin Industries, Consumer Products Division, in the Pacific Northwest. He replaces **Earl White,** who has been assigned as primary electric heat district sales manager in the Minneapolis area.

► **Gordon W. Smith** has taken over as district sales manager for Packard Bell television, radio and stereo hi-fi in the northern California territory. He replaces **Jack Fletcher,** who retired.

► **George B. Sharkey,** for the past year manager of field distribution on the West Coast for Chrysler Airtemp, has been named to the newly created position of market specialist for the Packaged Heating & Cooling Department.

► **J. S. Kendrick** has been appointed vice-president, and **McNeely DuBose** has been made consultant for Sandwell International Ltd. Kendrick has been associated with the Aluminum Co. of Canada for the past 11 years and carried out preliminary field studies for the Kemano-Kitimat power system. DuBose, who recent-

NEW PENGO POLE-MOUNT TENSIONER



*Now...*PENGO 4000 Tensioner Takes Conductor to 336,500 cm-ACSR or 397,500 cm-AAC —Tensions to 1,000 Pounds!

Here's a bullwheel tensioner you can carry in every line truck! It features two 18 inch neoprene lined bullwheels. Tru-Stop disc brake – yet weighs so little it's truly portable.

Two men can easily place the 4000 PM against the pole, attach it (chains and wing-nut tightener are permanently attached to tensioner), and start stringing in a matter of minutes. Conductor can be payed off any suitable reel stand. A collapsible reel attached to a winch shaft makes a practical puller, although any type of power previously used for pulling can be used.

TENSION WIRE STRINGING is the safe, economical modern way to string distribution and transmission lines. Why not get the facts? Write for new PENGO catalog TSE-1 for full data on the world's largest, most complete line of tension stringing equipment. Please address Dept. 34.

PETERSEN ENGINEERING CO., INC.

460 Kifer Road
Santa Clara, California
Phone: AXminster 6-7712

B-15

ly retired as vice-president for Aluminum Co. of Canada, directed the construction of many of that company's hydro developments between 1939 and 1959.

► **Dick Hausenberger,** inside salesman for J. A. Tudor & Associates in Portland, will attend the Allen-Bradley Co. sales school in Milwaukee in June.

Management Changes

Nathan A. Toalson was elected president of the A. B. Chance Co., succeeding F. Gano Chance, who will continue as senior office and board chairman. **C. L. Hansen** was made vice-president and general manager of the Chance Division and will direct operations at San Francisco as well as other division offices . . . **Edward R. Brewer** is now president of Brewer-Tichener Corp., succeeding the late James H. Greene . . . **Charles Wenner,** president of James R. Kearney Corp., has been elected to Hubbard's board of directors . . . **J. D. Greensward** was elected president of Canadian Allis-Chalmers, succeeding Harold M. Schudt, now director of manufacturing for Allis-Chalmers International . . . **Robert L. Chandler** has been made president of Keystone Mfg. Co., recently acquired by Avis Industrial Corp.

Jasper Blackburn has appointed **W. J. Clark** as its sales manager . . . **Carl E. Widell** has been elected vice-president in charge of marketing for Wagner Electric Corp. . . . **Leonard J. Siegal** has been promoted to sales manager by Marcus Transformer Co. . . **Norman E. Shipley** is now sales manager for the Delta-Star Division, H. K. Porter Co. . . **Milton F. Kent** has been made manager of G-E's newly created electric utility marketing operation . . . **Nye S. Spencer** has been appointed utility marketing manager for I-T-E Circuit Breaker Co. . . . Day-Brite Lighting has made **Russell E. Owen** its manager of marketing service . . . Anaconda has appointed **Austin W. Dunham** as manager of utility sales . . . Simplex has elected **John W. Logan** as executive vice-president. **Marshall A. Williams** has been made director of marketing for Simplex . . . **John H. Otis** has been made manager of sales administration for Paragon Electric Co. . . . Worthington Corp. has made **C. F. Hendrie** utility consultant for steam power products . . . **Robert O'Keefe** has been named distributor sales manager of Burndy's utility-industrial division.

Announcing **2 New Industrial Products from EDWARDS**

entrance register

Edwards new In-dicator system keeps track of key personnel. Telephone operators or receptionists can tell who's in at a glance, without wasting time or using noisy voice paging systems. Ideal for offices, plants, schools and institutions.

switchboard push button panel

1 PERSONNEL IN-DICATOR

- When flipped by key personnel, toggle switches on entrance register automatically carry "in-or-out" data to switchboard panel.
- operator presses button adjacent to individual's name—lamps indicate "in-or-out".
- individual executive desk switches can be substituted for switch on entrance register panel.
- both systems install easily and quickly.

From Edwards long experience in annunciator systems comes this completely new line of lamp annunciators...developed in cooperation with leading utilities, chemical process and industrial plants. Here are some outstanding features:

#1 RECTIFIER FAILURE
EVAPORATOR FEED TANK OVERFLOW
RECYCLE BRINE TANK OVERFLOW
440 V. POWER FAILURE
OVERCURRENT #1 RECTIFIER
35 PSI COMPRESSED AIR FAILURE
VENTILATOR FAN FAILURE #1 CELL LINE
CATHODIC PROTECTION RECTIFIER FAILURE

2 INDUSTRIAL LAMP ANNUNCIATORS

- flexibility of indications—modular "plug-in" construction permits simple establishment or change (from the front) of operational sequences without altering terminals, connectors, or jumpers.
- wide selection of operational sequences to cover all requirements.
- indicating circuit provides extra contacts and terminals for data logging or other control functions.

EDWARDS

THE EDWARDS SELLING TEAM

Selected electrical distributors across the country stock and sell Edwards products. Recognized electrical contractors install them. Edwards technical representatives in 58 cities throughout the United States and Canada work with them from initial planning through installation and follow-up, to guarantee complete satisfaction.

Edwards Company, Inc.
Norwalk, Connecticut

Please tell me more about the following products:

☐ the new Personnel In-dicator. ☐ the new Lamp Annunciators.
☐ both the In-dicator system and the Lamp Annunciators.

Name_____

Title_____

Company Name_____

Address_____

Here are answers to some about KPF switches

Q. *How can KPF switch blades maintain positive contact with switch clip under changing line sag conditions?*

A. Two heavy copper clips, bolted to a shoe carrying the flexible jumper, are mounted inside a special "horseshoe shaped" casting by two toggle bolts, These toggle bolts pass freely through the outer leaves of the clips, and the entire contact assembly "floats" on these bolts. Half-spherical bolt heads and adjusting nuts permit movement in any direction. The tension of the clip leaves on the blade is sufficient to insure positive alignment, since either clip or blade can follow the other to conform to line sag changes.

Q. *How can insulator stacks follow normal line sag changes?*

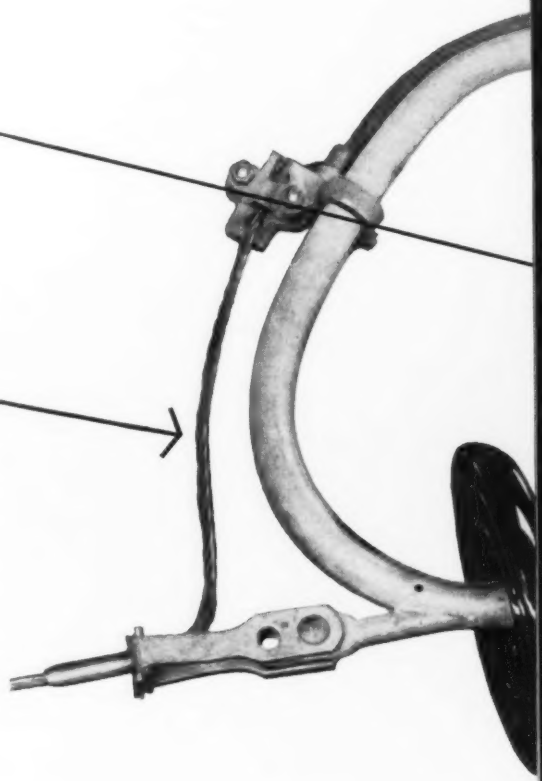
A. The insulator stack bearing units may be likened to limited universal joints. The actual bearing, a monel pin in an everdur trunnion, allows 90° movement of the rotating arm of the phase unit, as well as approximately 7° vertical movement to follow line sag. It is impossible for the bearing to bind under normal line stress, and insulator stacks always follow the sag of the conductor.

Q. *How are conductors connected to KPF switches?*

A. With KPF Type A switches, the user eliminates dead-end insulators. Any standard strain clamp can be used, and hot lines may be dead-ended directly to the phase units. Switch arms and dead-end eyes are integral with the insulator assembly. The conductor is lead through the strain clamp and on to a copper terminal on the switch arm. Aluminum conductors may be connected to the switch arm through special KPF terminals designed for this service. Type A switches may be mounted on a separate crossarm with conductors deadened below or above (for angle-pole installations, etc.). Switch operates equally well with or without line tension.

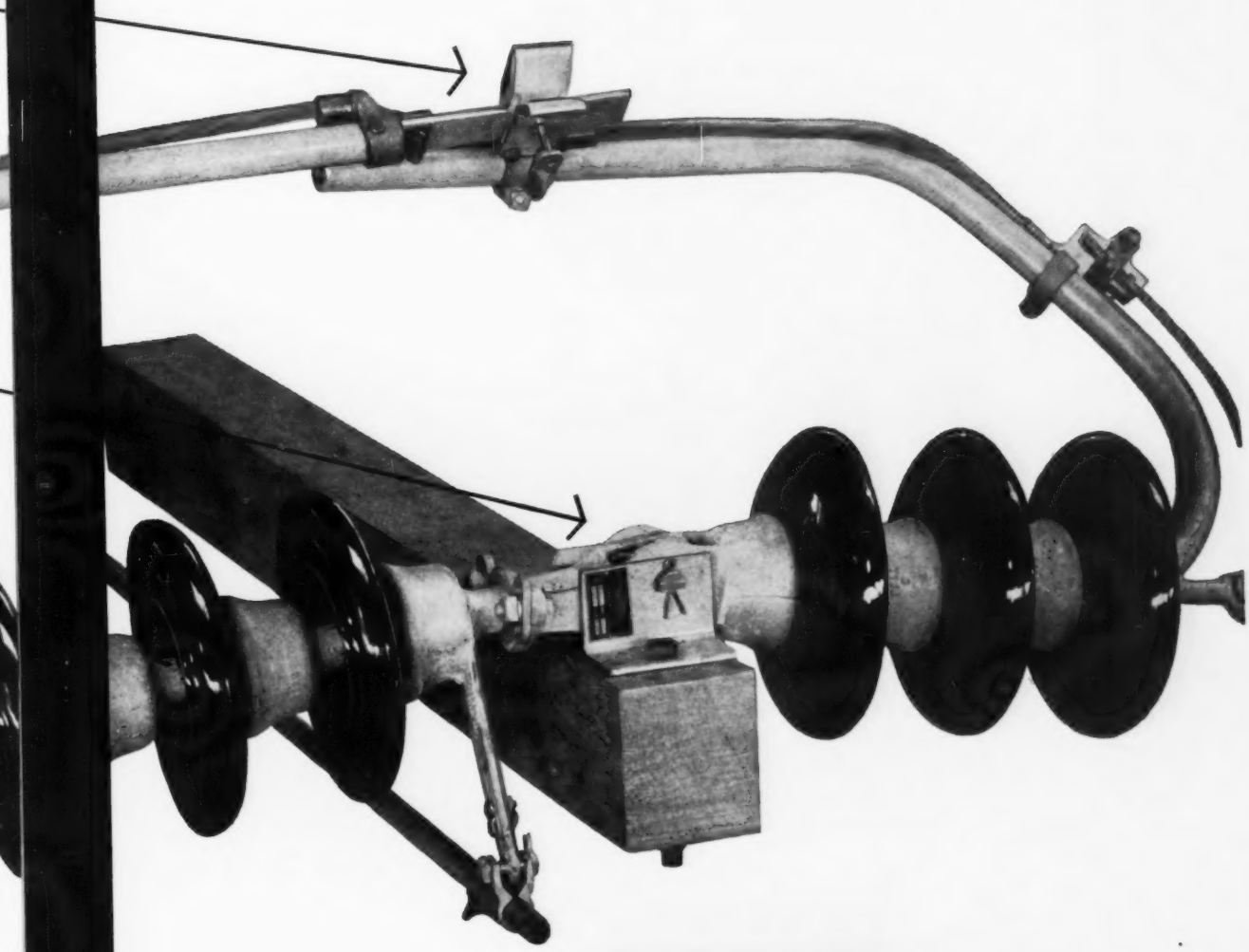
Q. *For what voltages are KPF air break switches available?*

A. KPF Type A and S standard "line-tension" switches are available for common voltages from 7.5 to 110 KV. Special switches combining a disconnect with a fuseholder (Type UF, double-cross-arm mounting) and for use where line tension is not present are also offered in these same voltage ranges. Ground switches are available for Type A or S switches. Type R switches are offered for use where line tension is not present or it is desired to use a specific type of apparatus insulator.



Request Catalog or write for details.
Test on your system this month!

often-asked questions



KPF
AIR BREAK
SWITCHES
Standard for half a century

KPF ELECTRIC COMPANY
P.O. Box 1257W • Stockton, California
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Slater First with the Dimswitch

...and the only COMPLETE line of Dimswitches!

All fit standard switch boxes ... no additional wiring

Indoors and outdoors, the Slater HI-LO Dimswitch provides increasingly popular two stage lighting for every room, den, TV, garden, patio, porch, pool and post lights!

High power Diode, plus Slater quality design, engineering and production make this the only real dimswitch on the market today. Engraved STA-KLEEN Wallplates (or Stainless Steel) available for any configuration.

THE SLATER HI-LO DIMSWITCH* INCREASES LAMP LIFE OVER 20-TIMES... PAYS FOR ITSELF IN LESS THAN A YEAR IN ELECTRICITY SAVINGS WHEN OPERATED IN LO POSITION.

WRITE OR CALL FOR WIRING DIAGRAMS, BROCHURE, PRICES

PATS. PEND. UL LISTING APPLIED FOR

Guaranteed by Good Housekeeping

*For incandescent lamps only

SLATER ELECTRIC & MFG. CO., INC.

GLEN COVE, N. Y. ORIOLE 6-1100

Earnings

Jefferson Electric reports highest first quarter sales volume in its history. Net sales increased 20% over the same quarter last year to $5,537,030. First quarter net income was up 12%.

Electrical Products Corp. of Los Angeles reports that booked orders for the first quarter amounted to more than $3 million, an increase of almost 20% over last year. President William J. Vaughan said that he expected sales for the year to amount to $12 million.

General Electric sales for the first quarter were off 2% as compared with the same period last year. Net earnings amounted to $52,614,000. Board Chairman Ralph Cordiner said that total orders received showed a 9% gain over the first quarter of 1959. Net earnings of $52.6 million were equivalent to 5.5¢ per dollar of sales, a slight increase over last year.

Babcock & Wilcox first quarter earnings were the highest ever reported by the company for the period. Income after taxes and minority interest was $4,981,000, equal to 81¢ per share as compared with 72¢ last year.

First quarter sales of **Allis-Chalmers** amounted to $126,392,931 and net earnings were $2,645,273. According to President R. S. Stevenson first quarter operations did not come up to expectations because of a slow start in farm equipment and construction machinery sales. Rate of incoming orders for electrical and mechanical apparatus has been running over 10% above that of a year ago, he said, and backlog of unfilled orders on March 31 totaled $248 million.

An increase of 4% in first quarter sales was reported by **Thomas Industries.** Volume of all divisions except residential lighting was up to expectations, according to President Lee B. Thomas.

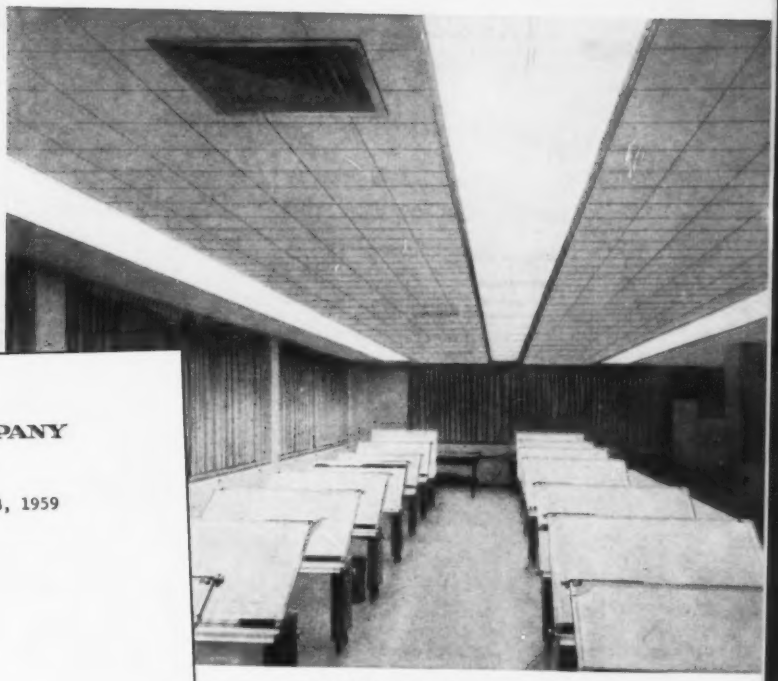
Kaiser Steel Corp. reported first quarter net earnings of $1.79 per common share as compared with 76¢ last year. First quarter earnings this year benefited from the fact that the company was not required to provide for federal income taxes due to a carry-forward of an operating loss attributable to the strike, President Jack L. Ashby said.

First quarter sales volume was 20% higher than the comparable period last year, according to **Landers, Frary & Clark.**

Philco reports a first quarter sales volume increase of 6.5% over 1959.

"Holophane is to be congratulated..."

ATLAS POWDER COMPANY expresses high satisfaction with their new lighting system. When Atlas designed the relighting of their Central Engineering Department, Holophane Specification No. 7559-C showed how to provide 170 foot-candles maintained illumination.



Central Engineering Dept., Atlas Powder Company.
Installed by Hatzel and Buehler, Inc.

ATLAS POWDER COMPANY
WILMINGTON 99, DELAWARE

November 13, 1959

Mr. C. C. Keller
Holophane Company, Inc.
342 Madison Avenue
New York 17, New York

Dear Mr. Keller:

We have completed the installation of the Holophane Fluorescent Lighting System, designated as 6404-64, in our Central Engineering Department. The maintained illumination level is 170 foot candles.

The installation has proved very satisfactory from the visual comfort and the illumination level. The graceful styling lends itself beautifully to our surroundings with particular reference to the shallowness of the unit.

Holophane is to be congratulated in designing such a unit from the mechanical and electrical angle. With the ballasts mounted at far sides and opposite corners, it provides cooler and safer operation together with a better weight distribution with respect to installation.

The unit is constructed in such a manner that all parts are readily accessible from an installation and maintenance standpoint. It is our opinion that we cannot offer any constructive criticism or suggestion in order to make this a better unit.

Very truly yours,

ATLAS POWDER COMPANY

CENTRAL ENGINEERING DEPARTMENT
TECHNICAL SERV. SECTION

R. G. Rudrow

R. G. RUDROW, MANAGER
ELECTRICAL GROUP

RGR:ms

The entire Holophane organization—particularly the engineers and craftsmen responsible for the development of Holoflux units — is gratified to acknowledge the plaudits from Atlas Powder Company... Recognition of sincere endeavor spurs greater effort and further accomplishment.

HOLOPHANE COMPANY, INC.
Lighting Authorities Since 1898
342 Madison Ave., New York 17, N. Y.
THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 18, ONT.

HOLOFLUX®—Recessed 2 Foot Wide Luminaire, featuring PRISMALUME® *(Prismatic Acrylic Plastic)*

No. 6400—Holoflux with prismatic border; in four foot lengths or continuous runs... Distinctive design integrates with contemporary interiors... Prismatic construction provides highest utilization of light, minimum brightness.

SERIES **22**

SERVICE AND MAINTENANCE BODIES

Four Models... Four Sizes

COMPARTMENTIZED TO FIT SPECIFIC JOB NEEDS

Which Series 22 Body do you need? Take a look . . . there's a model especially designed for your particular type of service work. The durable, all-steel unit shown above, equipped with an optional overhead rack, is widely used for general service work in all operations. Other models for electric, telephone and gas service have similar compartments fitted with various shelves and bins to meet specific work needs. Result: You get a custom-made body at a mass-produced price . . . plus increased crew efficiency on every job.

Series 22 Body features include flat, 16-gauge compartment tops . . . rust-proof, cadmium-plated door latches . . . nylon bushings in all door hinges . . . key-locking, weathertight doors . . . recessed, slam-action door catches . . . corrugated steel floor.

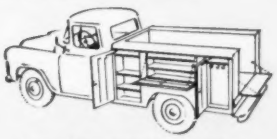
Available in 75″, 90″ and 104″ lengths, equipped with accessories to fit your particular need.

Need more storage space? Any of the four Series 22 models can be furnished with an all-steel superstructure. In addition to any optional items desired, the superstructure is fitted with two full-length shelves and three swivel hooks on each side, a window in the head panel and grab handles at the rear.

Self-Elevating Ladder Assembly

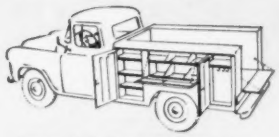
This time-saving assembly with six rubber-covered rollers and four powerful coil springs enables one man to quickly and effortlessly erect a ladder up to 36′ in length. The operator lightly pushes the end of the ladder down, and the springs do the lifting. Stowing is equally fast and easy. Ideal for use on 75″, 90″ and 104″ bodies. Includes 28′, 30′, 32′, 34′ or 36′ two-section extension ladder.

FOR ELECTRIC WORK



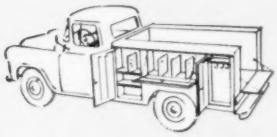
Series 22-E. Designed for service work in any phase of the electric utility industry. Special shelves and bins carry all the equipment and materials needed in the field.

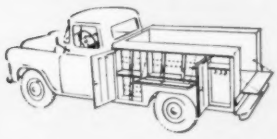
FOR TELEPHONE WORK



Series 22-T. Compartmentized to carry a variety of telephone service tools, parts and materials. Standard arrangement of shelves and bins enables crewmen to quickly find items needed on the job.

FOR GAS WORK





Series 22-G. Two variations of this model are available for carrying either cast or tin meters. Rubber-padded compartments insure the safe storage of fragile parts and instruments.

Plenty of additional bins, shelves and racks carry tools, pipe, fittings, parts and all other equipment needed on routine or emergency service and maintenance calls.

Another reason why
UTILITIES EXPECT MORE FROM

POWERS American

UTILITY BODIES AND EQUIPMENT

McCABE-POWERS BODY COMPANY

5900 No. Broadway
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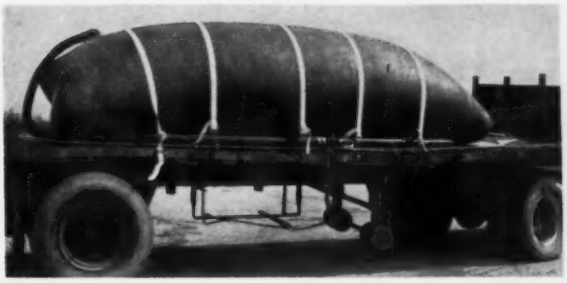
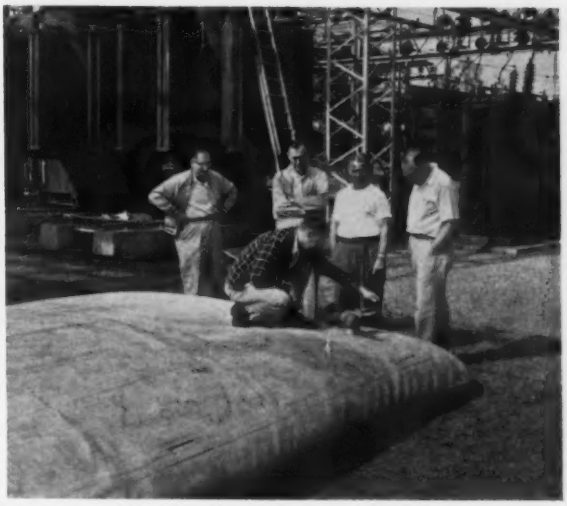
PRODUCT NEWS

New Designs and Applications





(1) PILLOW TANKS for storing and transporting oil are being used by some electric utilities to replace steel tanks. There are sizable savings, according to the manufacturer, in use of these collapsible and light-weight tanks, which can be rolled up when not in use. They do not contaminate the oil, it is stated. An 1,800-gal transport tank is shown on left. Various sizes are available from the manufacturer, Aviation Products Division, Goodyear International Corp., 1144 E. Market St., Akron 16, Ohio.

Voltage Regulator

(2) *Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.*

UNOREG, a new self-contained automatic voltage regulator, is for use on the low-voltage side of more than 400 standard distribution transformers. Rated at 1¼ kva, the new device will handle distribution transformer sizes up to and including 25 kva.

The manufacturer reports that in a few months a 2½-kva model will be available for use with transformers through 50 kva.

Of compact and lightweight design for easy pole mounting, the unit provides plus and minus 5% regulation of 120/240-v secondary lines. According to the manufacturer, UNOREG can be applied to a distribution transformer at a cost of $150 plus installation.

The unit consists of an induction regulator controlled by a solid-state voltage-regulating control. According to the manufacturer, laboratory tests show that it is capable of operating for at least 20 years without failure. Data obtained from field tests indicate that the control range is held within the specified limit of plus and minus 1¼ v. The new device is 21½ in. high and 12¼ in. in diameter.

Cooking Center

(3) *Hotpoint Commercial Equipment Department, 14th & Arnold St., Chicago Heights, Ill.*

Introduced at the National Restaurant Show, this new custom cooking center is claimed to offer almost unlimited flexibility. Developed to meet special requirements of space-conscious kitchen planners, model HM1 is designed to serve all types of fast food operations.

The package contains special adaptations of the manufacturer's Super HK3 fryer, Rocket griddle, Rocket hotplate, plus a deepwell cooker that is convertible into a surface unit.

Although the HM1 is offered as standard equipment, other model variations can be custom built on special orders, the manufacturer states.

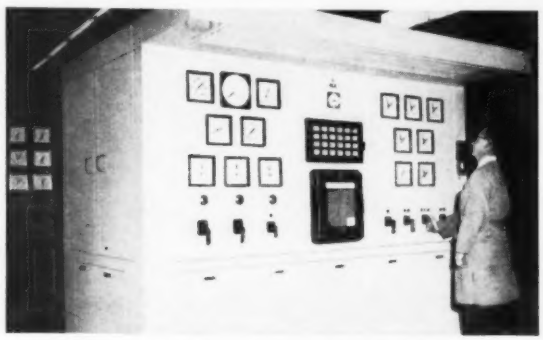
For Priest Rapids...

10 Kaplan turbine governors by Pelton, each rated 2,297,600 ft.-lb. effort

Priest Rapids Development, for which B-L-H's Pelton Division is furnishing 10 Kaplan turbine governors

The Priest Rapids Development is another indication of the important role played by Pelton in the Pacific Northwest's water power development. Pelton is now manufacturing 10 large governors for the Priest Rapids Development, Public Utility District of Grant County, Ephrata, Wash. At a minimum operating pressure of 300 psi, the total effort for each governor is 2,297,600 ft.-lb., of which 1,180,000 is for control of the wicketgates and 1,117,600 for control of the Kaplan blades. To certify that Pelton's governors will meet contract specifications in every respect, exhaustive shop tests are performed prior to shipment.

In addition to governors, Pelton manufactures hydraulic turbines, butterfly valves, spherical valves, pressure regulators, surge suppressors, waterworks valves, large centrifugal pumps, duplex strainers, dynamic balancers, etc. For illustrated informational bulletins, write B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth St., San Francisco 10, Calif.



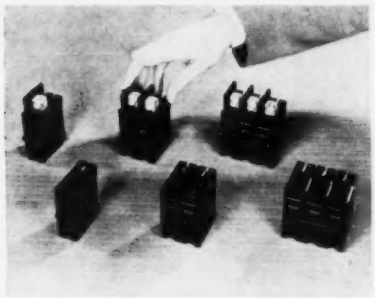
Governor for Priest Rapids being inspected at Pelton's San Francisco shop

BALDWIN · LIMA · HAMILTON

Pelton Division · San Francisco, Calif.

Hydraulic turbines • Valves • Governors • Centrifugal pumps

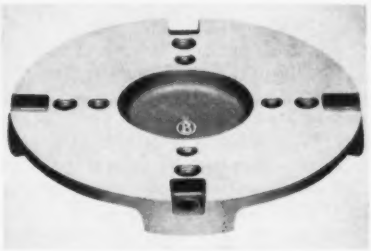
For phone number of closest representative see advertising index in back of book.



Circuit Breaker

(4) *I-T-E Circuit Breaker Co., Philadelphia, Pa.*

Easier operation and installation are claimed for the manufacturer's new molded case circuit breaker for residential, commercial and light industrial applications. The new design incorporates expanded handles on two- and three-pole models, running the full width of the breaker for easy manual operation. Model EQ-B for bolted connection is shown in the back row and Model EQ-P for plug-in is shown in front.



Post Insulators

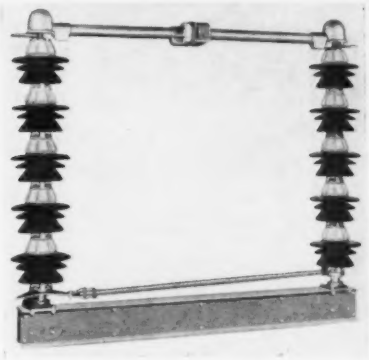
(5) *Ohio Brass Co., Mansfield, Ohio*

A time- and money-saving feature of the new Unipost is the fact that identical units fit any place in the stack. According to the manufacturer, it is no longer necessary to deal with specialized top, bottom or intermediate components during assembly.

Because each end of every unit is interchangeable, any unit may fall into the full load-bearing location in the stack. Therefore, maximum assembly strength is present in every end cap of every unit, the manufacturer points out.

To adapt the large base dimensions to industry standard bolting attachments, two Uniplates (illustrated) are supplied with each stack assembly. Thickness of these plates is included in published stack heights. Uniplates are drilled and tapped to standard specifications.

All Unipost stacks are symmetrical and sizes are never mixed. Therefore, one kind of unit in stock will serve to build or maintain any stack of given mechanical and electrical rating, the company states. Uniposts come in three strength ranges: standard, high and extra high.



Switch

(6) *Southern States Equipment Corp., Hampton, Ga.*

Type WT center side-break air switch is now being supplied with a voltage rating of 230 kv and a continuous rating of 1,200 amp. The manufacturer states that the unit has smooth, well rounded contours to suppress corona and that Amplitact contacts give maximum security under high short circuit conditions. Cast-aluminum shields for hinge and contact assemblies protect against ice and corrosion. Type WT comes also in voltage ratings as low as 34.5 kv and continuous ratings of 600 and 1,200 amp.

Housing

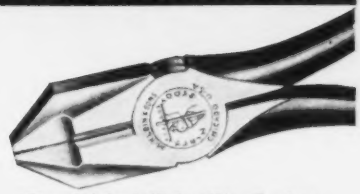
(7) *Killark Electric Mfg. Co., 3940 Easton Ave., St. Louis 13, Mo.*

The manufacturer's GMMS series is an all-aluminum explosionproof manual motor starter housing. This compact series comes with mounting lugs for convenient installation and a large screw-type cover for easy access. A set screw on the cover maintains proper alignment of the control buttons with the starter motor, the manufacturer states. The housings are front operated and are suitable for custom hub arrangements.

For more information, use coupon on p 143

KLEINS

for LINEMEN and ELECTRICIANS



The Original Klein Side Cutting Plier—Also available in NE (Streamlined) type. Cat. No. 201

High Leverage Plier—Extra high leverage permits cutting extremely tough wire. Also available in the standard type as shown above. Cat. No. 213-9NE

High Leverage Oblique Cutting Plier—A recently introduced plier designed to cut toughest wire. Cat. No. 228-8

Electrician Conduit Plier—Reams inside and outside of conduit, tightens lock nuts in outlet boxes. Cat. No. 333-8

"Since 1857" the name Klein has stood for the finest in tools and equipment for linemen and electricians. It is the uncompromising high quality back of the name Klein that has won Klein Pliers their place in the hands of men who know good tools. Klein Pliers are now available in a wider variety of styles and sizes than ever before. Be sure the pliers you need carry the Klein trade-mark.

Klein Catalog Free—This new Klein catalog giving complete information on Klein tools and equipment for linemen and electricians will be sent on request. Write for your copy.

Ask Your Supplier—Foreign Distributor: International Standard Electric Corp., N.Y.

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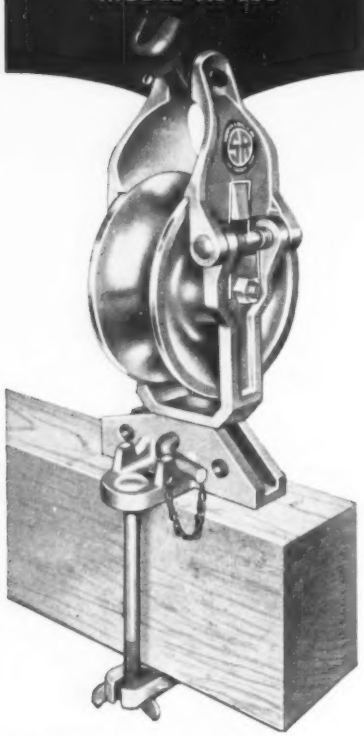
S&R Universal Stringing Sheave
MODEL XS-100



USE on CROSSARM as shown

USE on ANGLE for cornering block

USE without BRACKET to suspend from insulator stringing

Light weight, adjustable bracket, tough aluminum alloy throughout, safety locking, wide throat and anti-friction bearings. Grooved for cable through 1¾" diameter. Designed especially for ACSR.

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NEW CATALOG
on complete line of S&R Conductor Stringing Equipment sent on request.

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Motors

(8) *Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.*

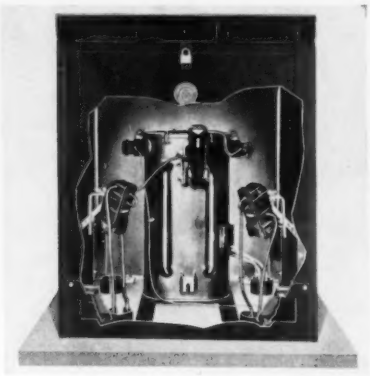
A new line of power house Life-Line A motors is available from 40 to 250 hp in frames 364U through 506US. Designed as auxiliary units for generating stations, these motors come in three basic NEMA designs for a range of applications. Specially designed end brackets provide maximum dripproof protection for the squirrel-cage units.

Clampstick

(9) *James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo.*

A fiber-glass shotgun stick featuring bright yellow color permanently molded in to make it easy to see in any light, under any sky, or in the beam of a spotlight at night has been announced by this manufacturer. Of high dielectric strength fiber-glass, the stick has been tested to withstand 100 kv per ft for five minutes.

The yellow, nonporous surface instantly shows up soil, dirt or grease that might cause excessive or dangerous leakage and can be wiped "safety-clean" in seconds and requires no costly refinishing, the manufacturer states. Available in 4-, 6-, 8-, 10- and 12-ft lengths, one-piece or hinged type.

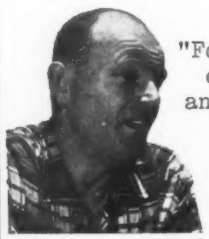


Transclosure

(10) *Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.*

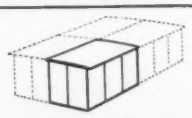
With larger capacities and more efficient venting than previous units, these transclosures are used for underground distribution systems that (1) serve residential, industrial or commercial areas; (2) supply highway lighting circuits; (3) require automatic switching equipment.

Three sizes can be assembled conveniently from modular components to accommodate overhead-type, single-phase distribution transformers rated 3 through 100 kva, the manufacturer states. Others accommodate overhead-type distribution transformers rated 333 kva. Transclosures also can be ganged for two- or three-phase applications. Maximum voltage rating of equipment to be housed in these units is 15 kv.



"For a combination electrical field office and storage shed that's quick to move on and off the job, I like Porta House. We have them on several jobs."

Just telephone Porta House collect and get immediate delivery. Prefabricated, bolted, waterproof plywood panels—can be moved on a pick-up truck.



SIZES 6' OR MORE BY 9' OR MORE.

PORTA HOUSE

Ridgely K. Dodge 6767 Broadway Terrace, Oakland, Calif.

Phone collect for immediate delivery: OLympic 2-7237

Lubricating Oil

(11) *Standard Oil Co. of California, 225 Bush St., San Francisco 20, Calif.*

A new lubricating oil, Super RPM DELO Special, was developed to upgrade the performance of diesel and heavy-duty gasoline engines. It is claimed to assure equipment operators longer, more trouble-free engine life, with greater bearing protection, cleaner pistons, rings and valves.

It is fortified with special detergent-action additives, corrosion and oxidation inhibitors and effective defoaming agent. According to the manufacturer, it has been thoroughly tested in the laboratory and under severe field conditions and because of its wide work range is particularly effective for simplifying mixed fleet operations.

In performance, it far exceeds the requirements of API service classification DG and DM, the manufacturer claims.

Aluminum Conduit

(12) *National Electric Division, H. K. Porter Co., Porter Bldg., Pittsburgh, Pa.*

Designed for installations requiring lightweight, corrosion-resistance and easy bending, a line of aluminum electrical conduit has been added to this company's line of steel rigid conduit. According to the manufacturer, an exclusive water soluble treatment used in a cleansing bath produces a lasting high-luster finish and increases ease of fishing conductors. The new conduit is made of prime aluminum alloyed to grade No. 6063 and processed to a T-42 temper to provide high ductility and permit close dimensional control during manufacture.

Boring Tooth

(13) *Petersen Engineering Co. Inc., Santa Clara, Calif.*

The new Pengo 16A50 Wisdom Tooth is now standard equipment on all its augers and drill heads for boring holes for poles, anchors and tower footings. It is said to be a quick-change, reversible, forged tooth that results in less strain and wear and tear on machines. The manufacturer states that it can be used on any Pengo auger or drill head of the various types in general use by the electric power and telephone industry.

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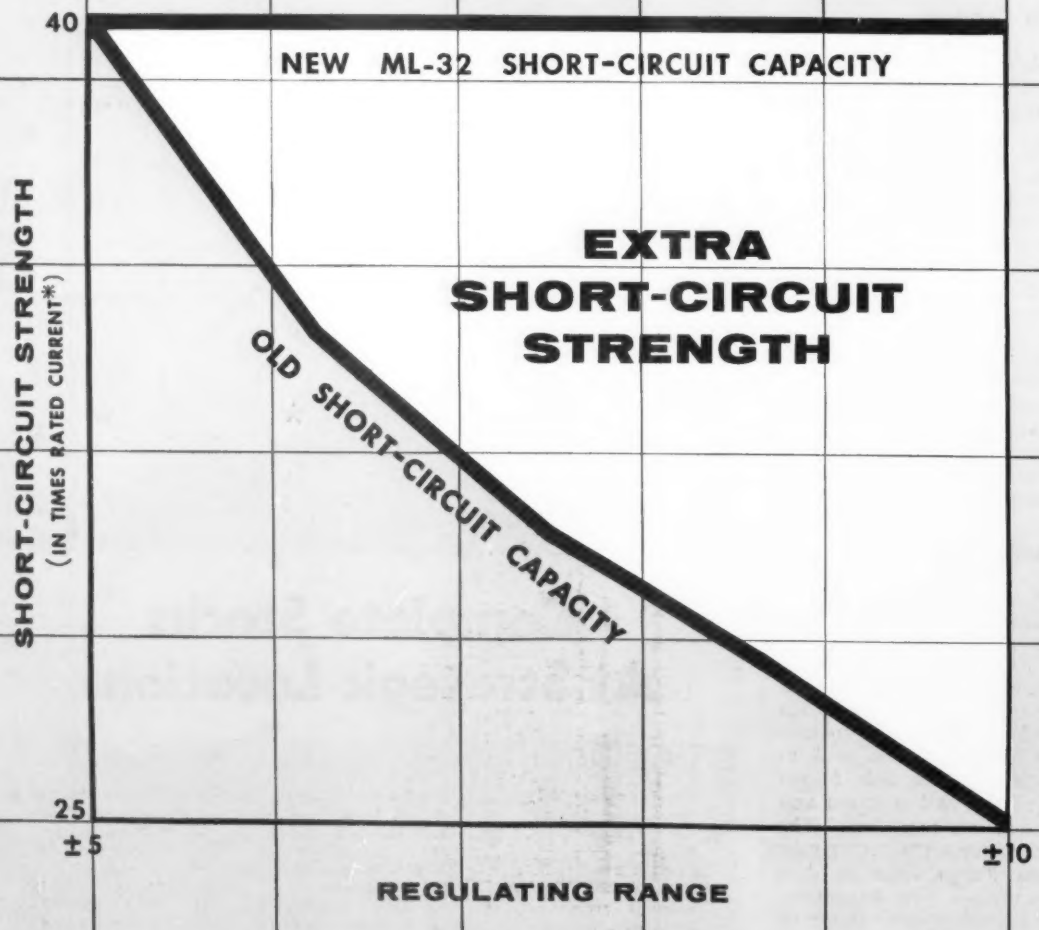
40 times rated current* short-



* *Rated current is the nameplate current at ±10% regulation.*

SINGLE-PHASE STEP VOLTAGE REGULATORS

circuit strength

New, stronger coil windings of General Electric single-phase ML-32 step voltage regulators will now withstand short-circuit currents of 40-times basic nameplate rating (the basic current rating at ±10% regulation) at all Load Bonus positions.

This increased short-circuit capacity is available for a duration of 0.8 seconds (48 cycles). With modern breakers, this time period gives ample leeway to detect a fault and de-energize the circuit.

Additional strength to resist high-current forces means increased protection against service outage under all current loads, plus even longer dependable life for already superior General Electric voltage regulators. Both of these important benefits are now available in G-E regulators at no increase in price.

These service extras are now possible because of the following G-E design improvements:

- **TIGHTER WINDINGS**—new coil winding process provides tighter, even coils; inherently stronger, better able to resist coil movement caused by short-circuit stresses.
- **SPECIAL INSULATION**—specially treated layer insulation forms a stronger winding-to-winding bond for finished coil. Additional protection added at points of most-severe stress to further resist coil shifting.
- **CONTROLLED DUCT SPACING**—cooling duct spacers are accurately positioned to hold windings firmly in place against radial forces during short circuits.
- **BALANCED WINDINGS**—coils are precisely aligned to resist destructive forces caused by short circuits.

This new high standard for voltage regulators is another dividend you receive from G-E research.

To learn more about all the reasons why G-E Voltage Regulators Cost Less on the Line, contact your nearby General Electric Apparatus Sales Office or Agent. Or write for Bulletin GED-3905, General Electric Company, Section 423-41, Schenectady 5, N. Y.

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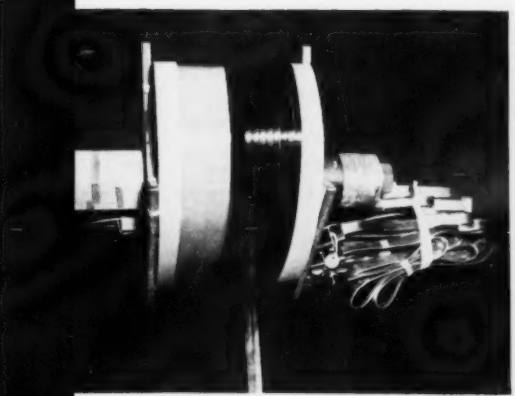


RUGGED COIL wound by new process provides stronger resistance to forces caused by high short-circuit current.

SPECIAL INSULATION strengthens coil by stronger winding-to-winding bond, resists movement caused by short-circuit currents.

EXTRA REGULATOR STRENGTH

(for a typical ML-32 100-ampere unit)

Regulating Range	Current Range	Former Short-circuit Capacity	NEW Short-circuit Capacity
±10%	100 amp (normal)	2500 amp	4000 amp
±8¾%	110 amp (load bonus)	2750 amp	4000 amp
±7½%	120 amp (load bonus)	3000 amp	4000 amp
±6¼%	135 amp (load bonus)	3375 amp	4000 amp
±5%	160 amp (load bonus)	4000 amp	4000 amp

Outlet Strip

(14) *BullDog Electric Products Division, I-T-E Circuit Breaker Co., Box 177, Detroit 32, Mich.*

Designed to meet electrical code requirements for grounding, the new three-wire Electrostrip is made especially for use with appliance and office machines. It will also accept two- and three-prong plugs. A flexible multiple outlet assembly made of new extruded polyvinyl chloride, Electrostrip is rated 20 amp, 125 v a-c and listed by UL.

Ratings Increased

(15) *S&C Electric Co., 4435 N. Ravenswood Ave., Chicago, Ill.*

New power fuses having short-circuit interrupting ratings up to twice those of previous units have been introduced by this manufacturer. Designated SMD-2B, these solid-material, drop-out fuses are rated 2 million kva (three phase) at 69 kv through 138 kv, 1.75 million kva at 46 kv and 1.5 million kva at 34.5 kv.

According to the manufacturer, the new design provides a more confining, smaller-bore arc-extinguishing chamber to interrupt lower faults and a larger diameter, less confining arc-extinguishing chamber for higher faults.

Rectifiers

(16) *Cornell-Dubilier Electric Corp., Norwood, Mass.*

Silicon rectifiers for medium power applications up to a maximum of 12 amp are available in ½-in. hex ceramic insulated or 7/16-in. hex styles in eight PIV ratings from 50-600 v. Electrical and mechanical characteristics in bulletin SC1012.

Transformers

(17) *Kuhlman Electric Co., Birmingham, Mich.*

The manufacturer's new PMT series offers pad-mounted transformers designed for residential underground distribution systems. This unit is installed above ground on a cement pad and is completely protected and self-contained.

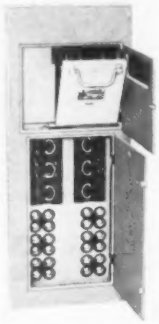
Its cabinet has separate low- and high-voltage compartments. A single door allows access to the low-voltage compartment, with an insulating panel closing the high-voltage side for safety.

Because the cabinet and transformer are joined by four bolted clips, transformers can be changed without trouble, the manufacturer states.

Service Equipment

(18) *Wadsworth Electric Mfg. Co. Inc., Covington, Ky.*

The manufacturer's new 200-amp, door-operated switch was designed for the all-electric home. Width is 14⅝, allowing it to fit in between studs set 16 in. on center.



This 200-amp fusible main is a three-pole, two-fuse, solid-neutral, 120/240-v service equipment device. It has two-, four- or six-plug fuse circuits and the plug fuse receptacles can be used for 240-v heater circuits or 125 v. The cabinet comes in either surface or flush mounting with dead-front construction and is UL listed.

Heavy-Duty Power Pumps

(19) *Greenlee Tool Co., Rockford, Ill.*

Four new heavy-duty hydraulic power pumps develop 10,000 psi continuous pressure and are designed to drive rams, jacks, presses and other hydraulic units. Powered by a self-contained ¾-hp, 115-230-v, a-c, single-phase, constant-speed capacitor-type electric motor, the new No. 1721 series has a pumping capacity of 150 cu. in. per minute at pressures up to 150 psi and automatic change-over to 30 cu. in. per minute up to 10,000 psi.

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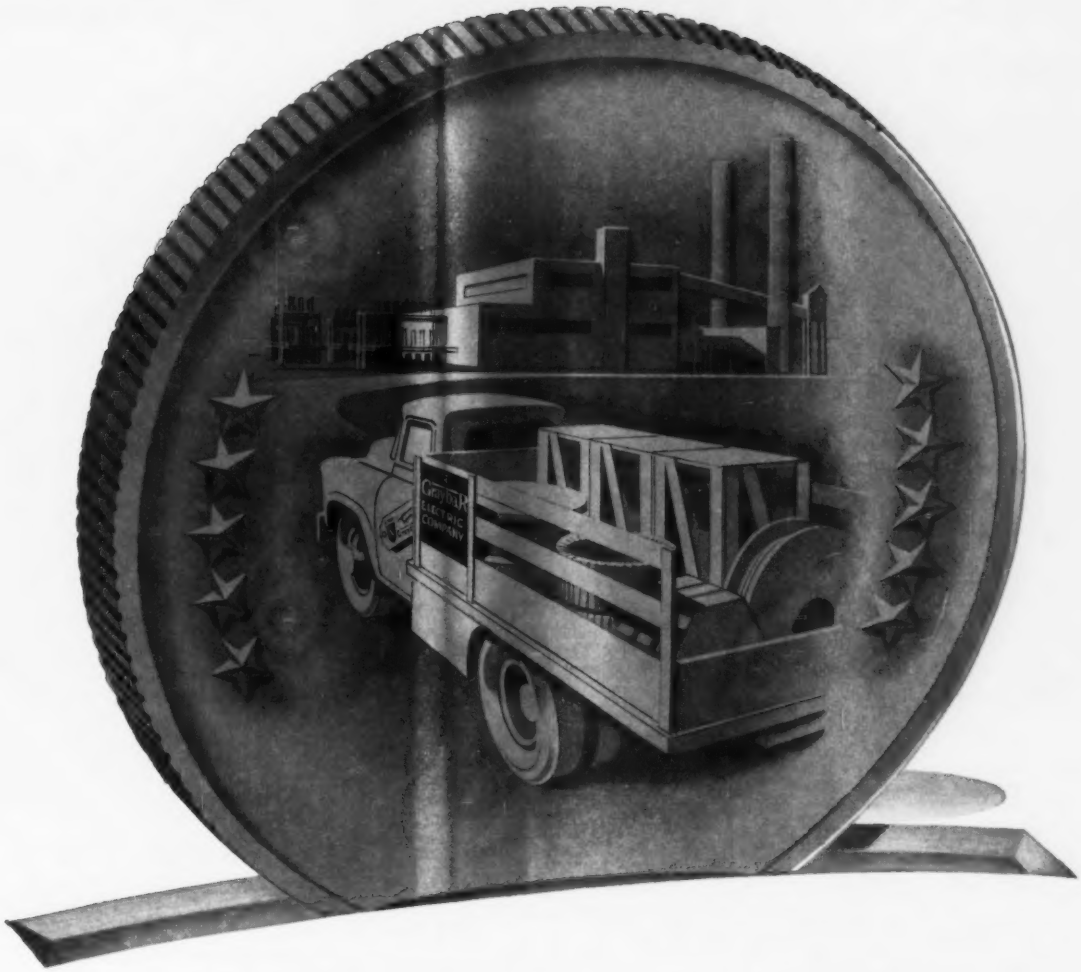

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Employee-owned Graybar, a part of your local community, has served utilities continuously since the first lines went up. Whether you require 3 items or 3,000 you'll find Graybar your nearest source for most of what you need.

Start things rolling. Call your Graybar man.

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Proven power equipment and Davey trained rope climbers... that's what makes Davey Surgical Line Clearance so economical. Utilities can rely on the dependable, efficient, and *adaptable* Davey crew. It will pay you to talk over your tree maintenance problems with the West's leading line clearing specialists—Call Davey.

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Hot Line Stirrup Clamps

(20) *Anderson Electric Corp., Birmingham, Ala.*

A new series of compression hot line stirrup clamps, designated series CPTS, is an adaptation of Anderson's snap-on design CPT compression clamp.

Stainless steel pins snap over the main and hold the clamp in place until it is compressed. The new clamps are also equipped with plated copper bails, which are staked into the clamps at the factory. Bail is adjustable so that any desired angle may be selected before compression is completed.

Installation can be made with many available tools and dies, the manufacturer states. Sizes to accommodate most main and copper tap combinations are available.

Marking Nails

(21) *John Hassall Inc., Dept. TR, Cantiague Road, Westbury, L. I., N. Y.*

For permanent identification and dating of electrical apparatus, utility poles and other equipment, three types of marking nails are offered in copper or aluminum. They come in varying lengths, 1½ to 3½ in., with head diameter from ½ to 1 in. and shank diameter from 3/16 to 5/16 in. Lettering, numbers and trademarks can be embossed on these marking nails, the manufacturer states. Special sizes are available upon request.

For additional information, use coupon, p 143

FOR SALE

Used Indoor Open Type Switchboard

Consisting of:

2—Westinghouse three phase induction regulators, five percent regulation, 364 KVA, 1000 amperes, 4200 primary voltage, automatic control.

2—Oil circuit breakers for above, double throw, mechanically interlocked, type "F11", 200A, 5KV, Westinghouse. (manually operated)

1—Switching reactor for above.

17—Westinghouse oil circuit breakers, three-pole, 7.5 KV, 400A, 50 MVA, type "F124" manually operated, 48 V.D.C. trip coil. Complete with operating handle thru switchboard.

17—Panels for above, complete with type 'S' ammeter and voltmeter, three overcurrent relays, type 'CO', one "OB" watthourmeter, two element, three three current transformers, one three element ammeter switch.

17—Three pole disconnect switches, 400 Amps, 7500 V, single throw.
Complete steel frame for switchboard and necessary copper bus runs.

4—Three pole disconnect switches, 600 A, 7500 V, double throw.

Our drawing S4-10862.

To be seen completely erected at CITY OF RIVERSIDE LIGHT DEPT., CALIF. 3854 Mulberry Street.

To be sold complete or in parts.

For information concerning equipment write or call

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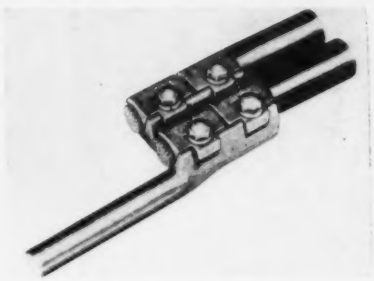
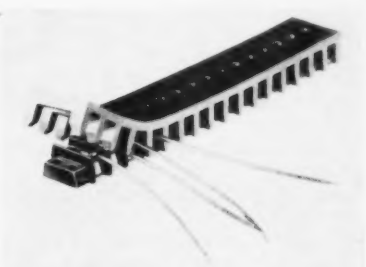


Power Connectors

(22) *Fargo Mfg. Co., 845 Main St., Poughkeepsie, N. Y.*

Two new basic designs, the P and the JJ series, are available for heavy-duty connector or bus applications.

The P series combines design features for increased range and conductivity. The sliding, two piece, wedge shaped pressure pad provides complete encirclement and the parabolic serrated grooves are designed for cable and IPS tubing. Neither series requires disassembly for insertion of the conductor or bus.



Terminal Block Cover

(23) *TA Mfg. Corp., 4607 Alger St., Los Angeles 39*

Available for hazardous areas are new rubber block covers for industry. They are available in a choice of neoprene, Buna-N or silicate rubber and come in three basic forms. One is a flexible casing, constructed with a wall between each terminal pole. Another is designed for barrier strips and a third is a thimble-type terminal cap for use where the larger unit is impractical.

ARMY and NAVY Also Use JAQUES Hydraulic EARTH AUGERS

*Pole-setting attachment optional.

ARMY REPORT ON JAQUES KJ-254**

"There was a performance test on Pilot Model (Jaques Earth Auger), Model KJ-254, built by Texoma Enterprises, Inc. This test performed in accordance with Military Specification Mil-A-516B, paragraph 3.9 through 3.9.2.

"This test was performed in sandy, gravelly, red clay, hard and dry to blue silty clay at bottom of hole. Average time per hole for 25 consecutive holes was 78 seconds. Average depth of holes was 67.2 inches. Machine functioned at normal temperature."

**JAQUES newly developed Model TJ-254 is 2½-TIMES FASTER than Model KJ-254!

Some of 29 JAQUES TJ-254's NAVY bought.

WHY BUY JAQUES?

1. JAQUES Augers have finger-tip, feather-touch controls... only 3 primary adjustments for easy, simple operation ... Mount on standard trucks...
2. JAQUES drill holes up to 60" diameter ... up to 25' deep in toughest soil... even in rock... FASTER, CHEAPER...
3. JAQUES have fewer moving parts for longer life... lower maintenance and operation costs... less "down time"...
4. JAQUES dig holes up to 45° angle, either side of truck... Patented pressure control takes strain off all parts when rock drilling...
5. FIRST Jaques built 29 years ago is STILL IN OPERATION!

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- Preformed Line Products Company
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3450 Wilshire Blvd., Los Angeles 5, Calif.
Phone: DU 1-3951 • TWX: LA-795

Rollout Switchgear

(24) *Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.*

New 5- and 15-kv metal-enclosed rollout switchgear (type P) has load interrupting switch shutters that cover the live bus when the switch is withdrawn. Fuses are withdrawn with the switch and may be replaced with safety, the manufacturer states. Enclosure matches the metal-enclosed switchgear.

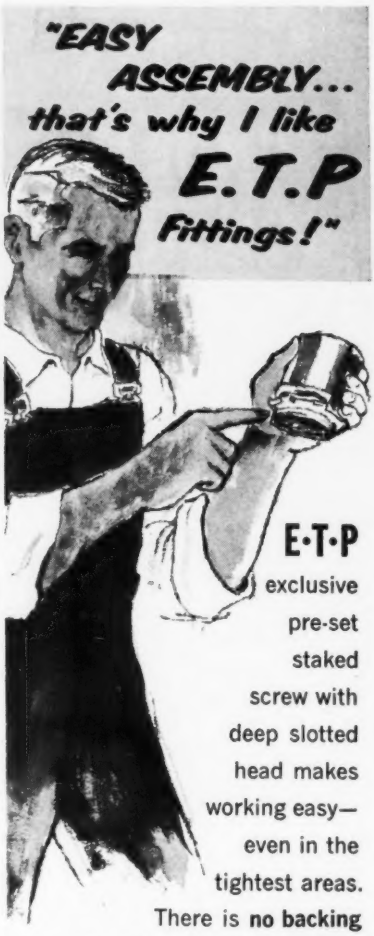
Basic available circuit arrangements include a single unit with line and load connections from above or below; a feeder unit, including main bus and load connections from above or below; a load center substation transformer unit with 82-in. throat connection to transformer, left or right hand, and line connection from above or below, with an auxiliary unit to house instrument transformers and other accessories.

All units have a metering compartment at the top with 20-in. panel space and approximately 8-in. clearance behind the panel. Units without transformer throat connections have more than 12-in. clearance.

Capacitor

(25) *Westinghouse Electric Corp., P. O. Box 2099; Pittsburgh 30, Pa.*

A new 100-kvar, single-phase capacitor is 25% smaller and 28% lighter than previous models. The new unit is available in ratings from 2,400 through 7,960 v. Chief advantage, according to the manufacturer, is the reduction in space requirements for pole-mounted banks and for stacked units in substations where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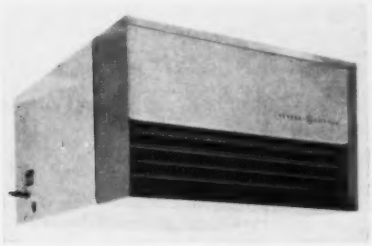
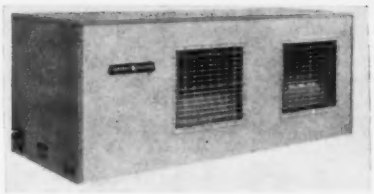
area is limited or land cost high. Lower size and weight also reduce handling and installation costs, it is pointed out. With the new capacitor as much as 1,200 kvar in 100-kvar units can be mounted on a single pole, the manufacturer states.





Cooling Unit

(26) *General Electric Co., Central Air Conditioners, Tyler, Tex.*

A six-ton split-system air conditioner includes a weatherized outdoor remote unit, Model TA75B3, and an indoor air handling unit, model TE 72BH. It is UL approved and rated in accordance with ARI Standards.

Heart of the outdoor section is the G-E high-speed compressor (3,450 rpm). Features include belt-driven, permanently lubricated ball-bearing blowers, which allow easy airflow adjustment and quiet operation; easy-access controls with "straight-in" accessibility for field wiring and maintenance. The fan is isolated from the compressor by a baffle to permit easy servicing without removal and replacement of exterior panels.

The outdoor section is shipped with a holding charge of F-22 and has built-in service valves bolted rigidly to the base to minimize installation and service delays. The manual reset switch is readily accessible without removal of exterior panels, it is pointed out.

The companion air-handler unit is finished in two-tone grey enamel and has permanently lubricated ball-bearing blowers belt-driven by a four-pole, cushion-mounted blower motor for quietness. A fan relay is furnished as standard equipment.

(For literature use coupon, p 143)

When transmission towers are rust-protected with Subox paints, both labor and material costs are much lower over the years. A single coat of Subox on weathered galvanizing will generally last for a minimum of 6 to 8 years and many companies report an average life of more than 10 years.

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BULLETINS ETC.

(27) **REPORT** — A performance report on Alcoa's special electrical joint compound for aluminum bus conductors is available to the industry from Rome Cable Division. The six-page report, accompanied by charts and graphs, analyzes service experience and laboratory evaluation of Alcoa No. 2 EJC. Copies may be secured from Alcoa-Rome offices or from 735 Alcoa Bldg., Pittsburgh 19, Pa.

(28) **INDUCTION MOTORS** — A buying guide for G-E's Tri-Clad '55 motors gives basic information on single- and three-phase units from ¾ to 150 hp. Bulletin No. GEC-1049, General Electric Co., Schenectady 5, N. Y.

(29) **OUTLETS** — Wiremold's Housepower Use-Planner is designed as an aid in planning outlets for modern living. It lists appliances and average wattages; provides squares for room layouts. Available from Wiremold Co., Hartford 10, Conn.

(30) **BUSHINGS**—A new bulletin, No. 546, from Lapp Insulator Co., Le Roy, N. Y., lists apparatus bushings for transformer, circuit breaker and special purpose applications. A complete choice of types, sizes and ratings is included. Featured in the 28-page catalog are the Lapp POC and POC-A lines of condenser-type, oil-filled transformer and circuit breaker bushings, 15-230 kv.

(31) **TREE TRIMMING**—Tools for tree trimming are listed in a folder available from Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit 2, Mich.

(32) **SWITCHES**—Enclosed safety switches, service entrance equipment, branch circuit panels and meter sockets are among the items listed in General Switch Co.'s new catalog 6002. Available to electrical wholesalers, contractors and inspectors. Copies may be secured from General Switch Co., 45 Roebling St., Brooklyn 11, N. Y.

(33) **ATOMIC ENERGY**—Design and construction of reactors here and abroad are treated in "Atomic Energy at Allis-Chalmers," a new bulletin released by that company. Included is information on resources and services provided by the company's Atomic Energy Division and a discussion of the division's technical personnel and research and production facilities. Available from the manufacturer at Milwaukee 1, Wis., as bulletin No. 43B9541.

(34) **INSULATION**—Physical and electrical properties of Limitrak surface-coating insulating material are given in booklet MB-1908-A available from Westinghouse Electric Corp., Benolite Plant, Manor, Pa.

(35) **BUILDING WIRE**—Specifications for Synthinol 901 building wire, types T and TW, are given in a folder from the advertising department, Rome Cable Division of Alcoa, Rome, N. Y.

(36) **GUYING**—"The Good Guy," a 32-page booklet, illustrates step-by-step application procedures of guy-grip dead-ends at the top, breaker and anchor locations of down guys.

The booklet illustrates procedures to be used in single guying, multiple guying to a single anchor rod and multiple guying. Copies of this bulletin (No. 37-300) and a 24-page pocket-size lineman's field booklet (No. 37-300A) are available from Preformed Line Products Co., Dept. GG-7, 5349 St. Clair Ave., Cleveland 3, Ohio.

(37) PANEL BOARD MATERIAL—Asbestos Ebony and Ohmstone, two asbestos-cement materials for electrical panel boards, are described in a 4-page folder from Johns-Manville, 22 E. 40th St., New York 16, N.Y.

(38) FEEDWATER HEATERS—Construction details and operating features of its feedwater heaters are given in an illustrated bulletin from Yuba Consolidated Industries. This bulletin, YHT 102, is available from the Yuba Heat Transfer Division, 4th & Main Sts., Honesdale, Pa.

(39) STARTERS—Engineering data on type CY starters are given in an 8-page illustrated bulletin from the Clark Controller Co., 1146 E. 152d St., Cleveland 10, Ohio.

(40) COMPUTERS—"A Return to Sanity in Computer Control" is the title of a bulletin available from Beckman Scientific & Process Instruments Division, Fullerton, Calif.

(41) GLOSSARY—Standard Wire & Cable Co. has issued a pocket-sized glossary of wire and cable terms. This pocket-sized bulletin is available on letterhead request to the company at 3440 Overland Ave., Los Angeles 34.

(42) THERMOSTATS—A complete line of thermostats for controlling electric heaters in residential, commercial and industrial applications is listed in a four-page folder from Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.

(43) MOBILES—Technical information about mobile substations rated up to 20,000 kva, 115 kv, and mobile transformers rated up to 40,000 kva, 138 kv, is contained in bulletin GEA-4415C. Available from General Electric Co., Schenectady 5, N. Y.

(44) CONDENSED CATALOG—Killark lists its complete line of aluminum fittings in a condensed catalog. Copies are available from the manufacturer at Vandeventer and Easton Ave., St. Louis, Mo.

(45) REELS—Adjustable wire reels offered in four mounting assemblies are described by Line Material in its bulletin 60010-CM3. Available from LM field engineers or from Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.

(46) QUICK REFERENCE—A pocket-size general catalog is being issued by Anderson Electric Corp., Birmingham 1, Ala. It contains complete indexes and other specification data on the company's connectors, clamps and fittings.

(47) PURCHASING—Methods for improving purchasing methods by a more scientific application of analysis techniques are covered in publication GED-3877. Designed to provide a detailed approach to the systematic appraisal of product values in business purchasing, the booklet includes a scaled checklist for evaluating equipment suppliers. Titled "Production Purchasing," the publication is available from Section 666, Apparatus Sales Division, General Electric Co., Schenectady 5, N. Y.

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How do you know your type SO cord or type W, G & Control cable is the best that can be had?
Look For These Two Symbols of Certainty:
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2. Each carton and reel carries a registered certification as to jacket contents signed by a professional engineer. When you find these guideposts, then you will know that you have the best.
*U.S. PATENT #2867001
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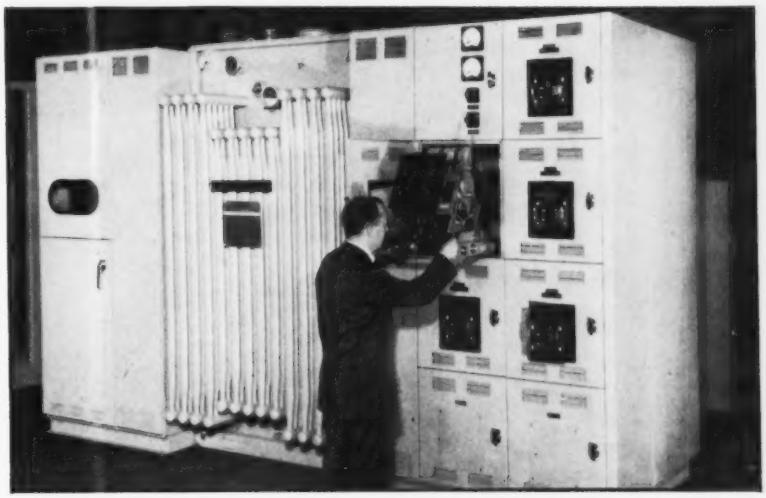

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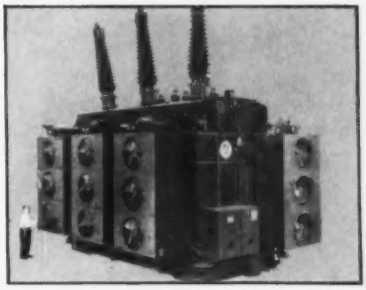

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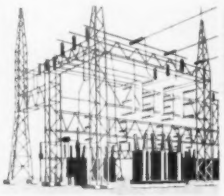

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